eLearn MAGAZINE Education and Technology in Perspective

eLearn Magazine
Volume 2006, Issue 2 (February 2006), Page 1

Feature: 13 (educational) things I'd rather do over the internet

Grandon Gill

Table of Contents

A recent article in *eLearn's* sister publication, *Communications of the ACM (CACM)*, engaged readers with the foreboding title "The Internet Education Bandwagon: Look Before You Leap" [10]. The body of the article contained many statements that were equally ominous—such as the conclusions section, which began: "Loss of education quality as a result of Internet delivery is the major concern identified in this survey." Since *CACM* is an outlet of considerable prestige in both computer science and my own discipline—MIS—such a grim prognosis for the future of Internet-based learning warrants serious attention.

Despite the article's obvious concerns about what an ill-considered movement towards Web-based courses might do to student learning, its author made a point of stating that Internet delivery might have some advantages as well. In the survey that was the principal basis for his conclusions (involving 51 students split between distance learning and classroom sections in a single MBA core MIS class) he specifically identified the strengths of Internet delivery to be:

- Convenience and flexibility
- Easier access to administrative information

These, in turn, needed to be weighed against a list of weaknesses including:

- Loss of lectures
- Loss of information delivered in visual and verbal formats
- Loss of a professor's views and perspectives

- Loss of classroom discussion
- Loss of questions on course content
- Increased level of group problems
- An expectation that course work should be individual in nature, not group-based

In reading these two lists and drawing upon my own experiences and those of my colleagues, it occurred to me that it might be possible to add some items to the top list and, perhaps, modify the bottom portion as well. The courses to be referenced in this article are summarized in Table 1. The technologies that were employed are described in Table 2.

THE LIST

The list of 13 things I'd rather do on line is ordered according to categories of benefits, referencing issues identified in the original *CACM* article.

Timesavers

An important concern expressed in the *CACM* article was that instructor productivity would fall as a result of the demands of online courses. My own experience in this area suggests that time demands are highly dependent upon the type of content [3], and that there are many ways in which use of the Internet can dramatically reduce instructor demands. Items on the list related to this include:

1. Distributing and exchanging content

Although the *CACM* article cited "access to administrative materials" as a benefit, my own experience suggests that the benefits in this area go far deeper than facilitating course announcements. Among the types of static content for which I use the Internet to distribute are assignments (e.g., text and attachments, such as source code), multimedia content (e.g., lectures, software walkthroughs, and assignment instructions), lecture notes, and readings. The capabilities in this area have grown dramatically over the past two years owning to rapid proliferation of broadband (virtually all our students have it) and equally significant improvements in content development tools, such as Camtasia, which can now generate multimedia that can be adequately delivered over a dialup connection.

On the exchange of content side, my acquisition of a Tablet PC has transformed my grading activities. In my MS MIS class, for example, I have each student write two research papers (typically about 15 pages each in length) that get handed in to me around the middle of the semester. I then make detailed comments on each paper, and return these to the students for incorporation in the final draft. In my pre-Tablet world, this process created a paperwork nightmare since this involved collecting individual papers and, at the end of the semester, examining both the marked-up first draft and final version to assign a grade. In the Tablet world, on the other hand, papers are submitted electronically, I save them and then read them on my Tablet (perfectly comfortable, in portrait mode), hand write my comments with the Tablet stylus, and return them (electronically) to the student. When it comes time for the final submission, I just retrieve the saved copy for comparison with the new version.

2. Accumulating content for reuse

Another important time-saving benefit realized in the courses derives from the ability to reuse content. In a traditional paper-based course, such as the *CACM* article described, cost and physical size limit how much material can reasonably be provided to students. Distributed electronically, on the other hand, the main challenge the instructor faces is organizing the content so that students can find it.

I have found reuse to be a particularly important source of time savings in the area of lectures. For example, starting in 2003, I began to post multimedia versions of my programming course weekly lectures on the Web. As a result, by the last six weeks of the spring semester 2004, I had one student (out of 100 enrolled) showing up to each classroom lecture. At that point, I chose to

redevelop the online lectures to a higher quality standard and dispense with the classroom lectures altogether. My course-tracking surveys—conducted at the end of each semester—found no change in student learning measures over the year that followed (objective or self-reported), except that the percentage of students falling into the DWF category (D-grade, F-grade, withdrawal) improved significantly, from about 50 percent to about 30 percent.

Naturally, the attractiveness of content reuse and accumulation depends upon the subject matter. In the case of a programming course, a complete rewrite is normally required every two to three years to address significant tool changes. In subject areas where the content is more dynamic, however, reuse benefits decline. With today's tools, however, I have found that even a single reuse justifies the creation of an online version.

3. Engaging in centralized Q&A

My colleagues and I have always found that using the Internet—particularly discussion groups—to respond to student questions of general interest to be a real time saver. This opinion is largely a result of our experiences in the programming course, where it is not unusual for discussion groups to exceed 100 postings for a single assignment (over 300 being the record)—and there are seven assignments. Satisfaction with these groups also seems to be very high (93 percent of students reported being satisfied or very satisfied; [3]). Since my TAs and I make our home phone numbers and email addresses readily available, we shudder to think what our lives would be like were it not for discussion groups.

Our experiences in this area appear to be at odds with those reported in the *CACM* article, which downplayed the usefulness of discussion groups. There are a number of different plausible explanations for this variance. First, such Q&A may be more effective in technical courses such as programming—where concise questions that seek unambiguous answers can be formulated. Second, the effectiveness of such groups tends to be very sensitive to response time. Using a combination of TA and instructor eyes, we have managed to bring typical response times to a student question down to a few hours. Should response time ever get to be higher than that of email, it is reasonable to expect that email would become the mode of choice. Third, students are sometimes unsure as to what constitutes an appropriate question, which can inhibit voluntary participation. For example, does posting a question from an assignment or posting a solution constitute cheating? In the programming course, we established a validation system based on techniques used in nuclear submarine training [5] that allows us to permit students to post anything they wanted. Had such a system not been in place, the questions posted might well have been limited to administrative issues (more consistent with the findings of the CACM article). Finally, there may have been alternative pathways that students could use to get questions answered. We have found, for example, that as we increase the number of TA office hours during the week, the number of discussion group questions drops dramatically, since students (already on campus for other classes) often find it more convenient to drop by the lab with their questions.

Engaging in Formative Assessment and Providing Feedback

Another important area where my colleagues and I have found benefits to using the Internet involves engaging in formative assessment and providing feedback—a benefit area not noted by the *CACM* article. Conceptually, the source of this advantage stems mainly from the flexibility of Internet communications. Because most Internet pathways offer both private and public equivalents (e.g., public vs. private chat rooms, synchronous classrooms vs. breakout rooms, discussion groups vs. emails), it is relatively easy to move back and forth between the two different forms of communications. In this regard, the Internet compares favorably to a classroom, where it can be difficult to mix public and private matters. Some examples:

4. Monitoring student progress

One technique that we have found very useful—and one that we can hardly envision in the absence of the Internet—involves having students report their progress on a regular basis [6]. In the programming course, ten percent of each student's grade is based on participation. Roughly 75 percent of that participation derives from making weekly reports, which may be done in one of three ways: a) meeting with a TA, either in person or online, b) submitting a Flashlight Online form that

details the student's status, or c) making an entry to a LiveJournal blog. We have developed software that allows us to consolidate the information (e.g., by reading the RSS feed from the LiveJournal blogs), along with Blackboard grades. The consolidated information is then automatically sent back to the student as a personalized Web page attachment to an email. Upon implementing this system, a dramatic increase in average course GPA was experienced, indicating that students were doing a better job keeping up with the course's demanding workload.

A similar monitoring activity takes place in the MS in MIS capstone course. Here, students are required to keep a Web log of their findings for a research project (currently involving developing a history of strategic systems first implemented in the 1980s) that represents 33 percent of their grade. Using the same software developed for the programming course, we monitor their progress to ensure that they are performing the appropriate searches. Using the Web, as opposed to maintaining a paper trail, makes it much easier for us, since we can capture and examine the blogs at any time.

5. Providing self-learning opportunities

Although using the Internet for summative testing (e.g., administering final exams) can be problematic for reasons of security and enforcement of rigor, we have found that providing practice tests can be highly beneficial to student learning. In the programming course, for example, we developed software that actually generated both assignments and practice tests [7] that could be uploaded to Blackboard. Since deploying these tests, performance on one of the assignments improved dramatically—from an abysmal completion rate to 90 percent completion—and the popularity of the assignment increased from least popular to a statistical tie for most popular. What makes this improvement particularly notable is that the assignment itself did not change during the process.

In developing examples for the C21TE workshop, we have also run into a number of classes that have used easy to learn, low-cost or no-cost Web-based tools (such as Hot Potatoes) to create interactive learning exercises. These types of exercises are extremely difficult to replicate in a classroom situation.

6. Assessing class participation

Where class participation represents a significant part of a student's grade, it is important to assess that participation in a manner that is as objective and reliable as possible. Unfortunately, achieving such reliability and objectivity can be quite difficult, particularly in discussion classes where the instructor acts as a moderator as well as keeping track of the quality of each student's comments.

Where the participation being assessed is Web-based, on the other hand, the situation is much simpler. In the MBA class, for example, we developed software that harvested each discussion group into a database, allowing the instructor to classify and grade each posting [4]. Although the task can be daunting— with a single case discussion typically running about 100 postings—doing so means we can periodically present each student with a complete profile of his or her online participation to date. At the request of a number of other faculty members, a colleague and I are currently working on a version of this tool easy enough for non-technical faculty to use.

Even where a specialized tool is not available, general tools for counting student posts and identifying their accesses to a course management system are widely available. Such information allows us to distinguish the student who is having problems despite making an effort from the student who chooses simply not to make an effort.

Supporting Collaboration and Cooperation

A particularly surprising finding in the CACM article was that little or no group work was demanded in the Internet course studied. In all five of the Table 1 courses—as well as a number of the cases developed for the C21TE Institute—group work has been a central component of this course design, irrespective of whether or not the course was taught partially or entirely online. Indeed, one of the key benefits of using the Internet for delivering content is the ways in which it facilitates familiar and novel group activities.

7. Creating venues for group activities

Even if a course is taught entirely over the Internet, there is nothing to prevent the students from getting together to participate in group assignments or projects. Where all students are traditional resident students, the use of the Internet should not hamper such activities. Where students are distributed in location and/or time, however, the Internet provides many mechanisms for establishing venues for group activities that could not, otherwise, occur.

As an initial example, one of the case studies developed for the C21TE workshop involved a graduate education course in counseling gifted students [9]. The course needed to be taught entirely online because its students were spread across the entire state of Florida, with a sprinkling of other states and international students as well. A substantial component of the class involved students developing counseling cases based upon their own experiences. After four of these cases were identified on the basis of student proposals, the instructor divided the class into teams of three to four students, each of which cooperatively developed the full case. Group areas were then established for each team in Blackboard, and the instructor monitored the process of case development by examining group-specific discussion boards, chat rooms and file exchange areas.

Another example of a group activity facilitated by creating an Internet venue involves the MIS capstone course, where 33 percent of each student's grade depends upon participation in three debate teams (on topics of current interest in the MIS field). Given a week to prepare for each debate, students post references and thoughts to a Blackboard discussion group set up by the instructor. Both sides (pro and con) are allowed to see each other's references and explore each others arguments. Using Blackboard to provide a venue for such research eliminates the complexities associated with scheduling multiple meetings for a group of five to seven people.

As a final example, in the database course students were provided the opportunity to develop a database case study as a team project. Two teams of three to four students elected to pursue this option. To support their collaborative activities, we established Elluminate offices where they could meet at any time. In addition, where desired, they could request the instructor attend their meetings, to provide assistance in the case development process. These facilities were used extensively over the course of the semester and greatly enhanced the feasibility of the projects—which had been constrained (in previous courses) by the fact that the students were all working full time, lived a considerable distance from each other and the class was being given over 60 miles way from the main campus.

8. Create opportunities for external involvement in a class

Internet technologies dramatically increase the feasibility of outsider participation in class activities, by making such participation much less time-consuming and expensive. In the MBA class, for example, we had a number of participants from locally developed case study sites monitor and post to the online discussions of their organizations' cases.

In the programming class, we scheduled a week-long experiment in which we compared different evaluation methods (e.g., tests, oral exams, interviews, lab exams) and delivery methods (face-to-face vs. online) for a particular assignment. Making the experiment feasible was our ability to acquire help from outside faculty and former course TAs, who conducted interviews and oral exams in online Elluminate offices from remote sites, as well as face-to-face in USF offices.

In the capstone MS class, we scheduled an online class day in which all normal class activities (i.e., case discussions and debates) were conducted synchronously using Elluminate (see Figure 1). In addition to the students, six faculty observers were able to attend the session from their homes.

A final example can be found in a course described in another C21TE case study. In this course, an undergraduate class in contemporary art, students participated in an Elluminate session that included the curator of a local art gallery, an exhibition curator from the state's east coast, and a couple of artists (joining the session from the northern part of the state) whose works were featured in the exhibition. Students discussed the artists' works that were displayed on the tool's whiteboard, and asked the curators career-oriented questions. When the online session was completed, the entire

class then reconvened at the gallery, where the original works were viewed. Student feedback on the online session was highly enthusiastic and the instructor herself was delighted by the depth and candor of the online question-and-answer period. Indeed, the only real complaint voiced by students was that hour-long online session had been way too short.

9. Application sharing

Particularly relevant to courses in the MIS area, a number of technologies (including Elluminate) are available that allow groups to view the same PC-based application as it runs on a single computer. In the programming course, this capability is used extensively, both to provide technical support to students (who can display their PC screens to the instructor or TAs) and in the conduct of oral examinations on student code, which is a central feature of the course's validation process [7].

Increasing Course Responsiveness to Student Needs

The CACM article expressed considerable concern that Internet-based courses would lead to a type of mass-produced education that would focus on bottom-line costs rather than student needs. Particularly troubling was the notion that reliance on the Internet could, uncontrolled, lead to "a more standardized, minimalist product targeted for a mass market [that] will further 'box in' and 'dumb down' education." While such an outcome would, indeed, be grave, such concerns should be tempered with awareness that the Internet offers opportunities to deliver content that is more, not less, responsive to individual student needs. Some examples:

10. Delivering content on demand

Particularly vexing for the classroom teacher is what to do in a situation where it becomes clear that additional content (e.g., lectures or course materials) is required to meet student needs. In the case of synchronous content, such as a lecture, the challenge faced is rescheduling. For static content, production and distribution become the issue. Compared with traditional methods, the Internet offers great benefits in the area of content "on demand." The most obvious example, already noted in Item 3 (centralized Q&A) can be found in asynchronous discussion groups. But this capability can extend far beyond providing timely responses to questions.

As an example, in the programming course TAs are continually developing new teaching aids to support student completion of assignments. Where the need appears to be great, we will sometimes develop new multimedia segments—easily done using "quick and dirty" techniques [8] such as animated screen capture. Rather than viewing such content as replacements for existing content—as we would doubtless need to do if such material were part of a hard-copy course packet (see Item 2, accumulating course content) —we instead link to it and explain the circumstances under which a student might find it useful.

11. Tailoring course design to student needs

Where the subject matter and pedagogy of a course is not etched in stone—often the case for advanced courses—how do you choose the course design that will be most effective for your particular group of students? In a traditional setting, the obstacles in the way of including students in such a choice can be formidable. First—unless you happen to teach a prerequisite course—you'll typically have to hold discussions with students in numerous sections (and convince other instructors to allow you to do so). Second, any feedback you get may require substantial restructuring of course materials and, perhaps, mundane challenges such as changing book orders well after specified deadlines. The Internet, on the other hand, offers tools that can mitigate many of these obstacles. Moreover, if you've been accumulating content (Item 2), the change may be less a matter of creating materials than of reorganizing what has already been created.

The most extreme example of such tailoring in our collection can be found in the graduate database management course. Students were contacted by email a few months prior to the first class meeting and asked to fill out an online survey regarding their areas of course interest. Using Elluminate, we then conducted a 90-minute online meeting, attended by about half the class, where we fleshed out the course details. This process led to a radical change in the design of the course-as well as several highly appreciative comments about the process that were passed on to the program director.

12. Facilitating self-paced learning

How do you accommodate students with vastly different backgrounds all attending the same course? In a lecture course, there would typically seem to be a continuum of strategies ranging from meeting the needs of the least well prepared (so as to maximize retention) to assuming that all students are well prepared (so as to maximize the amount of material that can be covered). Using the Internet, however, it becomes possible to implement a self-paced design where the needs of both the best-prepared and least-prepared students can be met.

The programming course provides an example of the use of the Internet to enable self-paced teaching. In this class, typically 50 percent of the students come in with no programming background whatsoever, 25 percent come in with a single previous programming course, and 25 percent come in with two or more programming courses. To allow students to proceed through the course at different rates, all lecture materials (multimedia recordings), assignments and other supporting materials (e.g., video clips, demonstration software, study aids) are made available at the start of the class. As the semester proceeds, student questions are answered on asynchronous discussion groups, during optional lab sessions, and during office hours (face-to-face and online). There are no due dates for assignments, and student progress is monitored through the progress monitoring system (see Item 4). Student reaction to the design has been quite positive overall, with 67 percent disagreeing that they would prefer to see a more conventional structure, and only 17 percent agreeing.

13. Accommodating student diversity

One of the most interesting outcomes accompanying the use of the Internet in our classes has been in accommodating student diversity. This outcome has been particularly striking in the self-paced programming course, where—for a sample of over 250 students—we took 19 diversity-related variables (left column of Table 3) and tested for relationships with 86 possible outcome-variables included in our survey (right column of Table 3). Our tests detected no significant relationships (beyond those likely to occur by chance, given so many tests). In other words, factors such as gender, race and even past programming experience did not appear to impact overall course performance or satisfaction with the course.

Other researchers examining Web-based courses have noted similar results with respect to diversity (e.g., [2]). Also interesting, those institutions currently producing the greatest number of female and minority graduates in computer science and MIS, such as Strayer and DeVry [1], have comprehensive online programs. It is becoming clear that Internet-based learning will play a crucial role in educating the student whose needs have not been well served by the traditional classroom approach to instruction.

CONCLUSIONS

Based on these examples, our list of online strengths and weaknesses would look rather different from those presented in the original *CACM* article. Unfortunately, the narrow objective of this article—to identify situations where the Internet can enhance education—could easily leave the reader mistakenly believing that my colleagues and I think Internet use is virtually mandated in every educational situation. To the contrary, using the Internet effectively in higher education can be very difficult and—for the faculty member—can entail considerable risk. In fact, there are a number of things that are (really) hard about Internet-based higher education. Five of these are the subject of the companion piece to this article, to appear in *eLearn Magazine* next week

References

1. AAAS. (2005) "Preparing Women and Minorities for the IT Workforce: The Role of Nontraditional Educational Pathways." *AAAS Education and Human Resources Programs, AAAS Science & Policy Programs, and the Commission on Professionals in Science and Technology.*

2. Clancy, M., Titterton, N., Ryan, C., Slotta, J., and Linn, M. (2003) "New roles for students, instructors, and computers in a lab-based introductory programming course." ACM SIGCSE Bulletin,

Proceedings of the 34th SIGCSE technical symposium on Computer science education, 35(1). 132-136.

3. Gill, T.G. (2004a) "Distance Learning Strategies that Make Sense: A Micro Analysis," *eLearn*, 8.

4. Gill, T.G. (2004b) "A Protocol for Online Case Discussions," *Decision Sciences Journal of Innovative Education*, 3(1). 141-148.

5. Gill, T.G. (2005a) "Teaching C++ Submarine Style," *IEEE Transactions on Education*, 48(1). 150-156.

6. Gill, T.G. (2005b). "Using Flashlight Online to Accelerate Student Progress." Accessed at http://www.tltgroup.org/resources/F_Eval_Cases/Gill.htm on 9/18/05.

7. Gill, T.G. (2005c) "Assignment-Centric Design: Testing the assignments not the lectures," *Decision Sciences Journal of Innovative Education*, 3(2), 339-336.

8. Gill, T.G. (2007) "Quick and Dirty Multimedia." *Decision Sciences Journal of Innovative Education*. Publication forthcoming in 5(1).

9. Gill, T.G. and Shaunessy, E. (2004) "Counseling Gifted Students: A Web-Based Course." *USF C21TE Case Series*.

10. Hirshheim, R. (2005) "The Internet-Based Education Bandwagon: Look Before You Leap." *Communications of the ACM*. 48(7). 97-101.

Author

Grandon Gill, Associate Professor in the Information Systems and Decision Sciences department at the University of South Florida, holds a doctorate in Management Information Systems from Harvard Business School, where he also received his M.B.A. His principal research focus is in the area of IS education, and he has published many articles describing how technologies and innovative pedagogies can be combined to increase the effectiveness of teaching across a broad range of IS topics.

Figures

Figure 1. Elluminate, during capstone online discussion

Tables

Table 1. Courses Being Discussed

Table 2. Technologies Employed

Table 3. Relationships Tested