

Righting the Wrongs: Mistakes Made in the Virtual Classroom

Leslie J. Reynolds, Sheila R. Curl, Brent Mai, Alexius E. Smith
Purdue University/Vanderbilt University

When teaching an electrical engineering technology course in the virtual classroom, instructional challenges are magnified in both course development and course delivery. Among these challenges are learning course management software, maximizing student motivation, enabling group learning and communication, and ensuring clarity of instructional materials and assignments. Although difficulties with many of the issues were anticipated during initial course development, experiencing them first-hand enabled us to identify their resolutions. Technology is developing at a rapid pace. In order to keep up with all the challenges these developments impose, it is essential that educators not only learn from their own mistakes, but that they share those experiences with colleagues and together advance the field of teaching. We will address problems encountered by both instructors and students and discuss how we improved our course delivery for subsequent semesters.

“As this century comes to an end...the defining characteristic of the current wave of technology is the role of information.”

Alan Greenspan, 14 June 1999 testimony before
the U.S. Congressional Joint Economic Committee.

What we teach in the virtual classroom

In recognition of the critical potential of new information technologies, Purdue's Electrical Engineering Technology (EET) program asked the Purdue Libraries to develop a credit course that would teach the students how to effectively locate, evaluate and present information. The ability to identify one's information needs, find appropriate and reliable information, use it to solve problems and communicate the resulting knowledge to colleagues, employers and the world is the foundation for *Information Strategies*.

This course addresses the information literacy skills needed by students in the EET program and integrates directly into that course of study. Students learn about their professional literature, the importance of it, how to find it, evaluate it and use it. When *Information Strategies* is taken in proper sequence (in the third or fourth semester of the eight-semester curriculum), the students benefit because they can apply information skills in their upper level coursework. The course as designed and has been required in the EET curriculum and taught by the Libraries' faculty since 1993.

As evolution of new technologies continued, course instructors were awarded a grant by the Indiana Higher Education Telecommunications System to "enhance and convert [the *Information Strategies* course] to a digital format, which will allow asynchronous statewide access." There is a growing demand¹ for this type of course, and a need for it at Statewide Technology Program (STP) sites where distance learners are earning Purdue engineering technology degrees. This version of the course was designed for the EET students participating in the STP and those on the main campus interested in online learning. Most students enrolled in the STP are employed adult learners who have reported liking the flexibility of scheduling that an online course allows. In July 1998, the investigators, Professors Sheila Curl, Leslie Reynolds, and Brent Mai, along with Alexius Smith, began adapting the traditional classroom course for delivery over the Internet.

Course Development

Information Strategies introduces students to the essential techniques of information retrieval, evaluation, organization and presentation. Initially, the conventional linear format that was used in the classroom was adapted:

Unit one: Information Sources and Evaluation

Identify and distinguish among types of information found in basic scientific and technical reference tools.

Assess source's scope, currency, format, bias and qualifications of compilers and authors.

Use table of contents and indices to identify content of sources.

Understand the structure and purpose of citation formats.

Identify parts of a citation.

Unit two: Online Searching (keyword and index searching)

Use different search methods.

Formulate appropriate search statements.

Distinguish between different searching techniques (e.g. keyword, subject, title).

Unit three: Journal Articles and Indexing Tools

Identify and locate journal articles on a particular topic.

Construct a citation.

Unit four: Specialized Literature

Introduce additional information sources in student's major field of interest (e.g. patents, standards, product literature).

Unit five: Search Strategies

Identify a personal information search strategy.

Apply this search strategy to a new information system (e.g. Internet).

However, simply creating a web-based version of the classroom model was impossible because of the classroom's linear format which allows for spontaneous developments predicated by the students' understanding and tangential teachable moments. The course was deconstructed and the central nature of evaluation was identified.

identify resources ⇒ evaluate
locate resources ⇒ evaluate
use resources ⇒ evaluate

We decided to adopt and adapt Subramanyam's circular model of the evolution of scientific information² as the framework on which to hang the course. The details of this adaptation will be addressed in forthcoming papers.

Once this model for the course was in place, the online lecture and discussion materials, activities, assignments, quizzes and case studies were developed. It was critical that we integrate search strategies, evaluation and citation formats, as well as address web sites to excite the students' interest. The redesigned course incorporated case studies as well as problem-based learning. By taking full advantage of WebCT course management software the instructors are able to integrate assignments, tests and self-tests, discussion via bulletin boards and chat rooms and provide an online team work area for students. The course culminates with a team final project based on an information need that needs to be resolved using previous assignments.

Course delivery challenges

Asynchronous learning environments “consist of a set of group communication and work “spaces” and facilities constructed in software. [S]pecial software structures [are] designed to support collaborative learning, including those meant to force active participation, and to allocate unique assignment topics, exam and gradebook facilities.”³ This sounds simple enough, but there are many instructional challenges that are magnified in both course development and course delivery when teaching in the virtual classroom.

Meeting the students

During the first semester this course was offered, the students were asked to introduce themselves through email messages. No face-to-face meeting with the students was planned. However, during the first several weeks of the semester several students visited instructors' offices to express confusion and frustration; it was decided to meet in person with the entire class. Those who could not come to the meeting in-person attended via the WebCT chat room. Two weeks later the class again met face-to-face to discuss continued progress. The level of the students' frustration and confusion was noticeably reduced.

The redesign of the course now includes a mandatory face-to-face meeting during the first week of the semester. The purpose of the meeting is to reduce the anxiety of learning online, to eliminate the most common technical problems experienced by the students, and to state expectations and behaviors of successful online learners.

Online learning anxiety. One factor of the students' online learning anxiety was reduced by eliminating the “facelessness” of online learning by meeting the students and instructors face-to-face at the beginning of the semester. Approximately 80% of the class members attended the orientation meeting and had their photographs taken. The photographs were posted when the project teams were formed. This way, students who

did not recognize names of their classmates, might see a familiar face in other campus settings. In the course discussion area, one student remarked to another “you are in my lab on Monday afternoons.”

Common technical problems. Also during this meeting with the students, the instructors provided the students with handouts outlining the basic navigation cues for the web site. Icons were defined. Instructors gave an online “tour” of the course web site and showed students how their attendance and participation is tracked. Additionally, students were given information on how to configure their home or workplace computers to access proprietary campus databases through the university’s proxy server. Some of the students’ most common technical problems involved basic computer skills. For example, the instructors demonstrated how to cut and paste from a document to a window in the course web site.

In order for students and instructors to interact with course materials, they must have a baseline of computer knowledge and experience. The students who attended the meeting said that the site tour and instructions were elementary and the web site was intuitive; however, the students who did not attend the meeting and neglected to seek assistance from the instructors or other students had difficulty logging onto the course web site, understanding the internal email client, posting to the correct discussion forum and locating the course material.

Expectations. The students who registered for the course were aware of its online format. The instructors were up front about the students’ behaviors that would be necessary to learn successfully in an asynchronous course. They were told that to be successful, they not only had to complete the assignments and tests, they needed to visit the course web site a minimum of twice a week and participate in the discussions. Students were told that they would need to work as a team to complete several assignments and the final project.

Multiple Web Sites

The first semester this course was taught, the instructors did not have a complete understanding of the full capabilities of course management software. WebCT was used for tests, discussion forums, online chat office hours, student presentations and some email. The course content and assignments were placed on a different web site. Understandably, the students were confused by having two web sites with which they needed to become familiar and use.

For the second semester, the instructors were able to redesign the course using all the bells and whistles available in the course management software. The multiple web site problems were solved and the one new course web site made tracking the students’ activity easier.

Email

The first iteration of the course used email accounts in WebCT as well as through campus/commercial providers. This led to confusion for both the instructors and the students. The instructors now only send the initial course meeting announcement and course login

instructions to students' campus/commercial email addresses; all other correspondence occurs within the course web site. The students must "come to class" to know what is going on and take responsibility for their education.

Development of the course for the second semester uses only the WebCT email, thereby reducing student's confusion about communication locations.

Chat rooms

Chat rooms were intended for the real time interactions of office hours and team discussions. However, the chat component was not used extensively because WebCT's chat rooms did not operate smoothly. The students complained it was "clunky" and took their real-time discussions to other chat applications outside the course web site.

The synchronous nature of chat rooms was also incompatible with the asynchronous style of this course. The students were used to Internet chat rooms, where, with thousands of potential users, someone was always in the chat room. The probability of more than one person being in the chat room decreases significantly when the population is only 30. The students needed to make appointments with each other to "meet" in the chat room.

Assignments/Instructional materials

In a traditional classroom, the instructor typically hands out the assignment and reviews it with the students. Student questions about the assignment can be fielded immediately. Online, the only way students have to interpret the material are the written instructions and all instructors have to evaluate whether or not the student is learning is their responses. Instead of an immediate and continuous interaction, it is unconnected and delayed.

Since the students cannot see the instructor, e-mail messages, topic discussions and course materials must carry the emotional content of the message in addition to the message itself. Online teaching lacks the visual cues of face-to-face interactions, students all see the assignment at different times and responding to questions quickly becomes difficult.

It was discovered that the students had difficulty understanding the assignments as they were written. Some students had difficulty with the technical aspects involved with actually submitting their work. Other students did not read assignment directions or had difficulty interpreting what was being asked of them. Drawing from student feedback, instructions for the assignments were refined to make them clearer. This refinement continues as student feedback is received.

Motivation

There are three significant aspects of motivation identified for online learning. The first aspect is controlled completely by the student. The asynchronous design of this course allows conveniences not found in other learning environments. Because this type of course is time and place independent, students have a level of freedom to manage competing priorities. Students are responsible for attending class when it is best for them. However, some students may not have developed the time management skills needed to work successfully in this environment. The responsibility to attend the asynchronous class becomes a burden.

Instructors of online courses must realize that a student's lack of time management skills is not a trait that they can affect through modification of the course. If instructors can identify these students early on, the student should be encouraged to take the course in a traditional classroom format. During the first semester, one student was self-actualized enough to realize that in order to be successful in a course, she needed the motivation of a classroom chair to sit in on a specific day each week.

There is second aspect of motivation that involves creating a course that motivates the student. Once a student is vested in "coming" to class, the course must deliver a dynamic environment that gives them a reason to continue participation. Through paced delivery of course content throughout the semester, the instructors were able to adapt material (i.e. case studies, discussion questions) and assignments to current topics.

The third motivational aspect of online courses that helps instill student interest involves regular instructor participation and facilitation in the discussion forums. Methods of encouraging student-to-student and student-to-instructor interaction in the digital environment are similar to those used in a traditional classroom. The instructor can ask a question of a particular student or ask the student to lead a discussion. During the second semester that this course was offered, the electronic discussion forums were redesigned based upon the content structure of the course and have been much more active than during the first semester. Several students checked them for "movement" on a daily (sometimes several times a day) basis.

Collaborative Learning

This course is required by the curriculum of the Electrical Engineering Technology Department and one of the course's components that this department desires is having the students work in teams. Cooperative learning is possible in cyberspace, but it is challenging. Team members have to be at the same level of motivation in order to successfully interact with each other. If one team member is passive, the team may flounder if they wait for that person to contribute.

During the Fall 1999 course, WebCT enabled the instructors to monitor the participation of students on their respective teams. Mid-semester, the teams were realigned to reflect the level of engagement. The students who were active in the course appreciated the realignment because they were now working within a team where everyone was vested in the success of the team and its work.

Time Commitment

It is a misconception to think that an online course takes less instructor time to either develop or to teach. In a traditional classroom, the instructor can arrive for the day's class and "wing it," the instructor in the virtual classroom must have all materials completely prepared. Any brief presentation or tangential remarks that may have occurred in the traditional classroom must be replicated word-for-word in the online classroom's material. Initial course development took almost an entire year and the input of four instructors. As the course was being delivered during the first semester, the instructors were revising it for the second semester. This revision

continued through the summer between semesters. Pieces of the course were also delivered throughout the semester with modifications to keep the course content current.

Just because the course is not limited by space does not mean the instructor has unlimited time. Day-to-day monitoring of and participation in the course's discussion forums was imperative; the course web site was always open on the instructors' computer desktops to provide quick responses to student questions. The students noticed when the instructors were away from the discussions for more than two days in a row. There were many assignments to be graded; the students needed feedback on each one. Student participation in teams needed to be monitored; teams needed to be realigned. Students dropped by the instructors' offices seeking guidance; on-the-spot re-teaching of the course's core concepts was necessary.

Other Challenges

Some of the course materials that the students needed to consult during the first semester were available only in print format, and only in the Engineering Library on Purdue's West Lafayette campus. This created a challenge for the off-site students who also needed to review the resources. However, by the time the course was offered Fall 1999, at least one type of each resource was available electronically to the students. The on-going adaptation of online technology by publishers will continue to alleviate the impact of this challenge.

The instructors have desktop Internet accessibility during the entire workday and are able to respond quickly to questions posted between 8 a.m. and 6 p.m., it was not as quick during the hours most students were attending class. It is easy for the instructors to pop into class throughout the day. However, the students needed to be in a computer lab or in the library to pop in and check and see if their question had been answered. Asynchronous is likely more convenient to the employed adult learner with Internet access from his or her place of employment.

Lessons Learned

As in a traditional classroom, the students' needs should always be considered. The technology is another means to the same end and does not change the primary purpose of the educational experience. However, the course taught in the traditional classroom cannot and should not be simply adapted for online delivery. It must be deconstructed, its primary components identified, and then reconstructed using the new technologies to teach those components.

The new technologies present challenges for the students as well as the instructors. Although the primary course delivery method will be through online means, meeting face-to-face with the students may help diminish initial student anxiety, provide an opportunity to address potential technical problems, and outline instructor expectations of successful students. Using integrated course management software will simplify course access, provide delivery of materials, and enable discussions for the students as well as simplify course management for the instructors.

Teaching a virtual class requires real time – lots of time. Instructors must prepare all course materials up front, anticipating questions and tangents that students would normally pose in a

traditional classroom setting. Clarity is essential; almost nothing can be inferred. Even after the course is developed, monitoring and participating in its delivery require more time.

Students who are self-actualized about their motivation for attending online courses will be more successful. Providing dynamic content increases participation of those students who are active, and the students expect regular instructor participation and facilitation in discussion forums. Collaborative learning is not easy. When working as a team, students face the same challenges online as they do in the traditional classroom. Even when students were not working as a team, collaborative learning was evident throughout the course. The instructors taught the students, the students taught each other, and the instructors learned from the students.

¹ Pamela Sebastian, "A Special Background Report on Trends in Industry and Finance," *The Wall Street Journal* (4 November 1999): A1.

² K. Subramanyam, *Scientific and Technical Information Resources* (New York: Marcel Dekker, 1981): 5.

³ Roxanne Starr Hiltz and Barry Wellman, "Asynchronous learning networks as a virtual classroom," *Communications of the ACM* 40:9 (Sept. 1997): 46.

LESLIE J. REYNOLDS

Leslie Reynolds is currently assistant professor of library science and assistant engineering librarian at Purdue University in West Lafayette, Indiana. She received her B.A. from Drake University and her M.S. in Library Science from the University of Illinois.

SHEILA R. CURL

Sheila Curl is currently assistant professor of library science and engineering librarian at Purdue University in West Lafayette, Indiana. She received her B.A. from Hunter College of CUNY and her M.S.L.S. from Columbia University.

BRENT MAI

Brent Mai is the director of the Walker Management Library of the Owen Graduate School of Management at Vanderbilt University in Nashville, Tennessee. He was previously assistant professor of library science and assistant management and engineering librarian at Purdue University. He received his B.A. from Bethany College (Kansas), his M.A. from George Washington University, and his M.L.I.S. from University of Texas at Austin.

ALEXIUS E. SMITH

Alexius Smith is currently assistant professor of library science and user instruction librarian at Purdue University in West Lafayette, Indiana. She is also a doctoral student in Education at Purdue University. She received her B.A. from Chatham College and her M.L.I.S. from the University of Pittsburgh.