

# EVERYTHING YOUR MOTHER NEVER TOLD YOU ABOUT RUNNING AN ON-LINE COURSE-OR AT LEAST MOST OF IT<sup>1</sup>

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*Abstract* - You have spent years learning to teach in a classroom. Feedback is usually quick and you can adjust as you go. Your students have spent years learning how to survive a classroom environment and, being engineering students, should be doing fairly well. Administrators have systems in place to cover all the emergencies anticipated given years of occurrences. None of this matters! In a fully asynchronous on-line course everything is different. This paper discusses successes and failures, solutions and problems for three courses being taught by the author.

## Introduction

Much has been written and presented at various forums about how to develop a web-based course. However, little has been discussed about the details of the operation of the course as opposed to the actual educational content. This paper hopes to begin to fill that void. Web-based and web-assisted courses have been promulgated as the future of education. Web-assisted courses can be very beneficial. Keeping course documents on a web site makes access easier for all involved (except a few non-traditional students). Using e-mail and instant messages for homework submission and questions can avoid the "just missed you" problem. Yet, a web-assisted course still has face-to-face time and the option of remaining traditional for most or even all the work as the student chooses. Some students minimize face-to-face time and enjoy the additional freedom the web provides. Others seek security and reassurance by keeping close contact with the instructor and minimizing electronic communications.

Web-based courses have no face-to-face time unless both professor and student decide to use a chat mode in instant messenger with web cams. While there may be scheduled virtual classroom times, few, if any students are there. And while academics can procrastinate very well (especially with grant proposals), they learned these skills as students. There is no automatic pacing mechanism when a course is fully asynchronous. With distances between instructor, campus and student measured in multiple time-zones, seemingly merely distracting paperwork can become a

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<sup>1</sup> A preliminary version of this paper was presented as "Keeping Students In Line During an On-line Course" at the 2002 IL/IN Sectional Conference of ASEE.

nightmare.

Three different course types have been taught as web-based by the author. The first is a senior/grad seminar/writing course dealing with basic research in production planning and management. The second is an engineering economy course for sophomores. The third type is an honors seminar either covering engineering ethics or the relationship of engineering and technology to society. (These seminars are 1 hour credit courses that provide a sidebar to various parts of the students' education.) Any level undergraduate may be in the course. Each of these courses provided a different set of challenges to be considered.

With each of these courses different types administrative problems arise. These deal with both university level situations, e.g. concerning the registrar's office, and with class administration by the instructor. Each combination of course and problem seems to require a slightly different approach by the on-line instructor. Part of this difference can be attributed to the level of tolerance the student has for bureaucracy; part simply to maturity and self-knowledge of their own abilities. Most schools have not moved to the on-line environment as have a few well known examples. Semesters still exist on a fixed calendar. Students and faculty need to turn in paper forms for most routine situations short of registration. Faculty evaluation and any student grievances require more paperwork and face to face visits.

### **Description of the courses**

Honors Seminar - By far the seminar format is the most easily adapted to web-based technology. By choosing a text with fewer chapters than weeks in the semester, fairly automatic pacing is provided. Each chapter is allocated one or two weeks. A number of discussion questions are posted by the instructor on an electronic bulletin board (BlackBoard® is used at Bradley.) and students must participate in the give and take discussion. Grading is easy as there is a complete record of what is said and when as well as by whom. To insure rigor, one or two short essays on topics from the text, chosen by the students, can be added. Electronic delivery and grading even saves paper.

An added benefit of such a course is in providing a straight forward approach to the "softer" ABET 2000 requirements - ethics, professionalism, current issues, etc. Even as a zero credit, pass/fail course, students can find time to really learn in this format. Most enjoy it. Art and theater majors have gotten so involved with technology concepts they register for the engineering ethics course. The interplay among diverse majors is interesting and informative.

Engineering Economics - This course is required of all engineers and some technology majors. At least eight sections are offered throughout the year; hence, a large audience and demand for this fundamental course. Putting the course on-line opens registration to students on co-operative assignment or taking practicum work. Putting the course on-line also means providing a second text which interprets the first and providing this in an on-line environment.

As every professor knows, students tend to avoid reading the text until absolutely required. However, the only on-line component better than a good text is a live spreadsheet with considerable annotation. Forcing students to read the book well is the best way to help them learn while on-line. In order to keep students somewhat on pace to complete the course during an allotted semester, an on-line quiz can be posted every one or two weeks. These should be short. Here hides one serious problem - ISP time-outs. While a student is working a set of 4 or 5 problems, they are not putting traffic across the ISP. Most ISPs automatically cut off dial-up lines after 10 or 15 minutes of inactivity. At this point the student attempts to submit the quiz answers and finds they cannot. They must have the instructor reset the attempt. Since this is a typical undergraduate, this often occurs about 1:00 a.m. or so. Expect frantic e-mails in the morning.

To minimize quiz problems, provide a number of self-tests which students may take as often as they like. Provide a series of hints on how to solve the problems in a set of keyed files. (BlackBoard® allows instructor responses to incorrect answers. This then directs the student to a solution file often in PowerPoint; the slides build the answer slowly so a student need not see the final solution, but only what steps they need to start the solution.)

Expect slightly lower averages in this section of the course - even if you can give partial credit. Students need a number of such courses before they become self-learners and rely less on the instructor. Yet, what the students do learn, they seem to retain well. This may be due to overcoming more of a challenge in learning the material.

Production Planning Seminar - Between the range of the previous two courses, this mainly masters level course involves more content than the honors seminar and less structure than the engineering economics course. Students read a number of assigned papers from the literature on a series of topics in Production Planning and Control. There is on-line discussion and then each student writes a position paper taking the role of chief engineer of their firm. To cap the course, each student chooses one topic to write an in-depth research paper suitable for publication.

## **The Problems**

### Timing Problems

1) Late adds to the course became a short term problem. Bradley's semester always begins on a Wednesday, so the first quiz in the Econ. course was that Friday. However, students can add and drop freely until the following (second) Friday. There was a second quiz on that Friday. Since the quizzes were both timed and available only during a set time-window, this raised the need for special make-up quizzes for late adds; but when to cut off their access to the new quiz? After all, they were also getting ready for the next Friday's assessment.

2) Students cannot tell time or read a calendar. Assessments were available from 10:00 a.m. CT until 10:00 p.m. that Friday. "But I worked until 9 that night and couldn't get to the computer in time." The rest of this scenario is left to the reader to complete as an exercise.

3) Internet connections and operating systems are not yet trustworthy machines. Once a timed assessment is begun, that's your chance. The need to reset the test and give students a new set of questions arose often; students did not seem to understand ISP timeouts and similar facts of web life. However, this required the student to make an effort to inform the instructor within the time-window of the quiz. Until well into the course few students considered this. They left messages which I retrieved from my voice-mail on the following Monday. So we ended up back in situation 2. Alternatively, they e-mailed frantically, usually about eight or nine o'clock in the evening. I know of few professors who check e-mail on a Friday evening. Again, back to situation 2.

During subsequent offerings of this course, I moved the test window to 24 hours - 10:00 a.m. Friday to 10:00 a.m. Saturday. This helped a little in that I could check voice mail and e-mail early Saturday. However, how many students are in any condition to take a quiz before 10:00 a.m. Saturday? (And that's even if they answer the voice or e-mail left for them that they have been reset.)

#### Office Hours

During the first few offerings of these courses, office hours were scheduled in the virtual classroom as well as instant messenger. Few students used these facilities; those who did usually were the better students. On the other hand, if you are in your office, you are considered fair game by students from traditional classes and by fellow faculty. That you are on-line with three students as part of a class is not either evident or important. A locked office door with a sign stating you are in a virtual class does stem the tide, but not stop it.

#### Helping each other (a.k.a. Cheating)

Some students cheat. In fact some expend more effort trying to cheat than they would if they just did the work themselves. A philosophy for assessment was required that clearly admitted to this fact and to the potential distances involved.

One system of assessment is for students to obtain local proctors from a high school or a junior or senior college near their location. These proctors would provide some assurance against cheating. However, the process is a bureaucratic nightmare unless significant office staff is available to verify the proctors' authenticity and to keep track of mailings, etc.

Another system is to arrange group tests of the students in one or more locations run by the course instructor and/or teaching assistants. This works well if the distances involved are not great and suitable locations can be found. However, it does compromise some of the asynchronous nature of the course.

Neither of these techniques is fully virtual – asynchronous and not location bound. Hence, the

need to become less concerned about every type of cheating became important. This is not to ignore cheating; rather this means develop a few barriers and then let the students act like the adults they say they are.

Quizzes and tests were set as a few random questions from various pools. These questions were chosen by the computer only when a student requested a quiz. (Note, some students do not understand 'random'. A re-occurring question was along the line of "On question two you wanted what?" This led to a search of that student's actual quiz to determine which question they had received as question two. This was not available until they finished the quiz.) Students could still cheat; a number could go to a lab and all pull up the quiz. For a typical quiz of 2 questions there were 4 or 5 questions in the pool. Chances are some of them would receive the same questions and if five or more, all questions would probably be shown. This one area seemed to function well. There was no correlation between sequence of taking tests/quizzes and scores earned. This instructor could not detect any simultaneous test taking; BlackBoard allows the instructor to note who is taking an assessment and also records when it is submitted.

### Summary

Good students learned a similar amount when taking the on-line course as others did in a traditional section taught by the same instructor. Poor students tended to perform more poorly, their weaknesses being magnified by the lack of visible structure. While individual grades cannot be disclosed, the class average did drop about 5 points versus traditional classes; this seems mainly due to the difficulty of providing partial credit on exams.

Further, the offering of the course to a single student who has special needs is now much more reasonable. An instructor even with full load can easily handle one or two students utilizing this course. Special needs can be met as they arise.

The use of internet based courses is another version of learning by mail. There is more interaction between the students and the professor and more is required from the instructor. However, this will remain strictly a method of teaching a few skill and not of delivering an education to a student. Courses for which there is a large audience provide one area for use. Course which are used only rarely can be offered more often at lower cost.

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