

Designing and Delivering Web-Based Courses for Professional Development and Traditional Students

Eugene Rutz
University of Cincinnati

I. Introduction

The College of Engineering at the University of Cincinnati (UC) has purposefully worked to provide more opportunities for working technical professionals to participate in graduate level courses and programs. Appropriate use of distance learning technologies is one method used by the college to make programs more accessible to professionals in the workforce. Web-based courses are particularly desirable because of the asynchronous nature of the delivery.

While the convenience of web-based delivery is attractive, courses must be developed and delivered in a manner that facilitates student engagement and learning. At the University of Cincinnati, courses are not usually designed exclusively for professional development of the workforce, but rather also have a traditional graduate student audience. Ensuring that the content and framework of the course is appropriate for both types of learners requires planning and purposeful instructional design.

The development and delivery of a web-based course in environmental risk assessment to both traditional graduate students and professionals in the workforce is described. The paper discusses the pedagogical framework for the design of the course and methods used to facilitate exchange among all the learners. Results of the student evaluation of the course are presented and recommendations are given for others interested in designing web-based courses.

II. Course Development

Radiological Engineering is taught at UC as a two quarter sequence with the first quarter emphasizing environmental risk assessment fundamentals and the second quarter emphasizing applications of risk assessment models to specific types of problems. Several individuals who work in the Cincinnati area had expressed an interest in learning about the risk assessment process but were unable to attend traditional on-campus lecture courses. The faculty agreed that the content of the first term of the radiological engineering sequence would provide the information desired and was amenable to delivery in a web-based format.

The traditional radiological engineering course had always been taught as a series of lectures covering a ten-week term. However, for the web-based course, the instructor re-evaluated the course learning objectives and the content with the objective of effective delivery via the web. Rather than segment the content in units that mimicked the traditional quarter, the instructor developed a framework that provided modules of instruction that had specific learning objectives.

The instructor developed a template that provided a consistent format for each module and a consistent pedagogical approach. The template was designed to guide the students through the web-based materials in a logical fashion, yet allowing for differences in learning styles. The module template included:

- Introduction to module content and navigation
- Module Learning Objectives
- Technical Content (usually provided in several distinct units)
- Readings (hyperlinks to on-line journal articles)
- Resources (hyperlinks to web sites and documents)
- Homework

In the module introduction, the instructor provided the context for the technical content provided in that module within the overall framework of the course. The instructor also suggested several different module navigation schemes that would appeal to individuals of differing learning styles.

Development of the technical content was an iterative process between the instructor and a graduate assistant. The instructor identified the content and constructed documents that presented the content. The instructor also identified resources available on-line that could supplement each module and provided opportunities for further exploration by individual students. Graphic material was also developed and used from other sources (with permissions). The instructor provided the graduate assistant this “raw material” and suggestions for an on-line format. The graduate assistant converted the materials to html, developed an appropriate navigational structure, and embedded links to other material and sites. The instructor then reviewed the material using a web browser and verified all links. Corrections and modifications were made by the graduate assistant.

Articles that described both principles and application of principles were an important element of the module framework. Well-chosen publications would increase the relevance of the content, particularly to the technical professionals in the course. Fortunately, UC has access to a superb on-line collection of journals through Ohio Link¹; these are available to any student enrolled in a UC course. Ohio Link provided the resource needed to enable students to get these types of material on line. The readings section was developed so that a student simply had to click on a link to obtain an on-line copy of the specific article.

The content was “housed” within a course management tool. At the time the course was initially developed, UC used Classware² as the means to provide web-based courses to students. The graduate assistant created an appropriate file structure within the Classware tool and transferred all files to the central server.

III. Course Delivery

The web-based version of the course was first delivered during the Winter Quarter 2000. Although the web-based format allowed students to view the material at their convenience, the

course was offered in the framework of the traditional academic term. The instructor sent email to all students before the quarter began providing instructions on how to access the web-based material as well as delineating methods for contacting the instructor with questions, technical problems, etc. The initial email also described methods for interacting with the instructor and other students through email and an on-line discussion board.

Specific due dates were given for homework assignments to ensure students stayed on-task and engaged. The homework required the completion of specific modules. Students submitted homework via email. The instructor graded the assignments and then returned them, also via email.

Two projects were also assigned that required students to work in two-person groups. Students communicated with each other by phone and email. The projects further promoted student interaction, particularly between traditional students and professionals in the workforce.

The discussion board provided another mechanism for purposeful interaction among course participants. The instructor would periodically start a new discussion by posting a question or some observation around an aspect of risk assessment. Students were asked to respond not only to the instructor, but also to each other. This “threaded discussion” was available at the students’ convenience and could be added to at any time. To further encourage students to participate, a portion of the grade was based on interaction.

IV. Student Evaluations

At the completion of the course, students were asked to complete an evaluation that measured their satisfaction with the course format, delivery and interaction among students and instructor. Responses were based on a modified Likert scale with 1 indicating “strongly disagree”; 3 a neutral reaction; and 5 indicating “strongly agree”. The evaluation and responses are summarized below.

Question	Response
Compared to other graduate level classes I’ve taken, I enjoyed the online format <i>as much as</i> a traditional classroom lecture class	4.2
Compared to other graduate level classes I’ve taken, I enjoyed the online format <i>more than</i> a traditional classroom lecture class	3.8
It was difficult to stay motivated for this course	2.2
Communication with the instructor was adequate	3.8
Communication with the instructor was effective	4.0
Compared to other graduate level courses I’ve taken, the workload was too high	3.8
Compared to other graduate level classes I’ve taken, the overall learning experience was <i>as good as</i> a traditional class	4.2
Compared to other graduate level classes I’ve taken, the overall learning experience was <i>better than</i> a traditional class	3.5

Navigation through the course materials was adequately explained	4.2
Course materials were well laid out and easy to navigate	4.2
Submitting homework via e-mail worked well	4.8
The ability to take the course anytime, anywhere was helpful	4.8
The class suffered by not having regular, scheduled meeting times	2.2
The assignments were adequately explained	4.2
The graded assignments were returned promptly	4.7
Lack of face-to-face communication (with other students and the instructor) was a detriment to the class	2.5
There was good correlation between the stated learning objectives and the content provided for each unit	4.2
There was good correlation between the stated learning objectives and the homework for each unit	4.3

Student responses indicated that they felt the on-line format was effective for this course and engaging. Students particularly appreciated the anytime, anywhere aspect of course delivery and the ability to submit homework electronically.

V. Recommendations

It is clear from this experience that courses can be developed and delivered that meet the learning needs of both traditional graduate students and professionals in the workforce. Furthermore, this experience has shown that the web can be an effective medium for providing content and interaction. A number of recommendations are provided based on this experience.

The instructor for this course was uniquely suited to develop and deliver the course. He had taught the content in a traditional classroom and he had himself completed a significant professional development experience in distance learning practice. This experience was unique among the faculty. It is strongly recommended that faculty receive professional development in both the pedagogical and technical aspects of distance learning. The University of Wisconsin at Madison provides an excellent program³.

Development of a web-based course requires a significant amount of effort, even for an experienced instructor. This is particularly true if the content is designed specifically for effective presentation via the web. While course management software makes it fairly easy to put documents on line, designing and constructing a course for web-based presentation is challenging. Instructors are encouraged to pay attention to instructional design to help students achieve the desired learning objectives. Software that is designed specifically for development of web-based content can also be helpful. Trivantis provides an excellent package that is particularly easy to use⁴.

Maintaining interaction via the discussion board required more effort than anticipated by the instructor. Students appreciate both timely and individual responses to their remarks. While the number of students in this class made this effort manageable, it could be significant for a large class. Since this is an important aspect of the course, instructors should plan for robust use of a discussion board.

The amount of reading the instructor required was substantial but the explanations concerning what was to be gained from the readings were minimal. Some students, particularly foreign graduate students, found the amount of material burdensome, while other students were happy to have a range of sources. Instructors should be clear about their expectations for reading assignments.

Bibliography

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EUGENE RUTZ

Eugene Rutz is Director of Engineering Professional Development and Distance Learning in the College of Engineering at the University of Cincinnati. Mr. Rutz has experience in teaching using interactive video classrooms, web-based courses and traditional courses. He is a registered Professional Engineer with experience in mechanical design, testing and analysis, project management and program development.