

A Look At Asynchronous Learning Network Courses As Used At Kettering University

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ABSTRACT

For the past ten years the use of computer based instruction (CBI) has been presented as providing learning benefits over traditional classroom methods. With the advent of the graphical browser for the World Wide Web (WWW) in 1994 ever increasing usage of this media has been explored. The World Wide Web currently allows us to include a combination of on-screen text, graphics, pictures, sound and movies as has been the case in traditional classrooms. The main advantages of the WWW is that it (1) no longer ties the student to the classroom on campus, (2) allows the student almost instant access to new materials posted by the instructor, (3) has the ability to deliver instruction to remote students easier and cheaper than other distance learning methods and (4) provides a truly asynchronous learning environment. This paper presents the initial efforts at Kettering University to include asynchronous learning networks (ALNs) as part of the overall learning experience.

INTRODUCTION

The long term key to improving American productivity is education^[1] Difficulties associated with using the traditional classroom to reach working professionals resulted in Kettering University developing an effective video taped distance learning system for the school's Graduate program. For the last two years the school has been actively investigating the use of the Internet to improve both the delivery and the content University's graduate programs. These efforts have resulted in the development of few graduate level courses as an initial attempt at providing a framework for asynchronous learning networks for use on the WWW. To leverage the effort and expense of developing asynchronous learning networks for the graduate program undergraduate courses (provided in traditional on campus classrooms) are being developed for asynchronous learning. This paper will look at two of these courses, one a graduate course called "Automation Topics for Management" , the second is an under graduate course in "Numerically Controlled Systems".

ASYNCHRONOUS LEARNING NETWORKS

The Distance Learning Team at Kettering University adopted the use of "asynchronous learning networks" to define the school's intent to provide anytime, anyplace based learning.

Kettering is using ALN as a framework for developing effective learning environments in which Kettering plans to incorporate as many of Blooms learning styles as our faculty can include in their courses.

Asynchronous Learning Networks (ALN) at Kettering have these basic assumptions:

- ALN's are learning environments
- ALN's can be entire courses or components of courses
- ALN's use technology as a delivery mechanism

It has been determined that for ALN's to be effective they must include the following: ^[2]

- structured learner-supportive activities
- technology mediation
- interactive or collaborative activities
- mandatory or optional learner participation
- substantial content resources
- useful but not necessary information and or activities
- 'stuff on the Web'
- computer networks
- collaborative activities
- mandatory learner participation
- online syllabus, other course info.

With this in mind we can then state that an ALN course has a technology-mediated interactive or collaborative component, substantial technology-mediated content resources, mandatory or optional learner participation, activities and resources structured to support learning (not just communication). The degree to which these items are included in any one course is dependent upon the individual(s) who create(s) the course.

IMPLEMENTATION

In Kettering University's efforts to develop effective ALN courses it was determined that during the development and testing phase the courses would continue to be offered in their traditional method and use the ALN version as an optional delivery method for those students willing to provide feedback on the format and content of the electronic version. This phase has been completed on the two courses selected for this paper and they are ready to be offered as Internet only courses the next term they are offered.

To introduce the reader to the selected courses they will be presented as follows:

- Introductory information page - presents information necessary to enter the course
- Technology-mediated interactive component - quizzes with instant feedback
- Technology-mediated collaborative component - discussion groups and guest books
- Mandatory and optional learner participation component - lecture material and homework

The two courses selected for this paper were structured by the author to be very similar in format in order to (a) reduce the amount of time students spend learning how to access the course and (b) to reduce the course development time.

COURSE INTRODUCTORY INFORMATION

The opening World Wide Web (WWW) page of each course has three frames which provide the student with the course title (Title frame) , a navigation menu (Menu frame) and the information and instructions (Main frame) required to access the course content (see Figure 1).

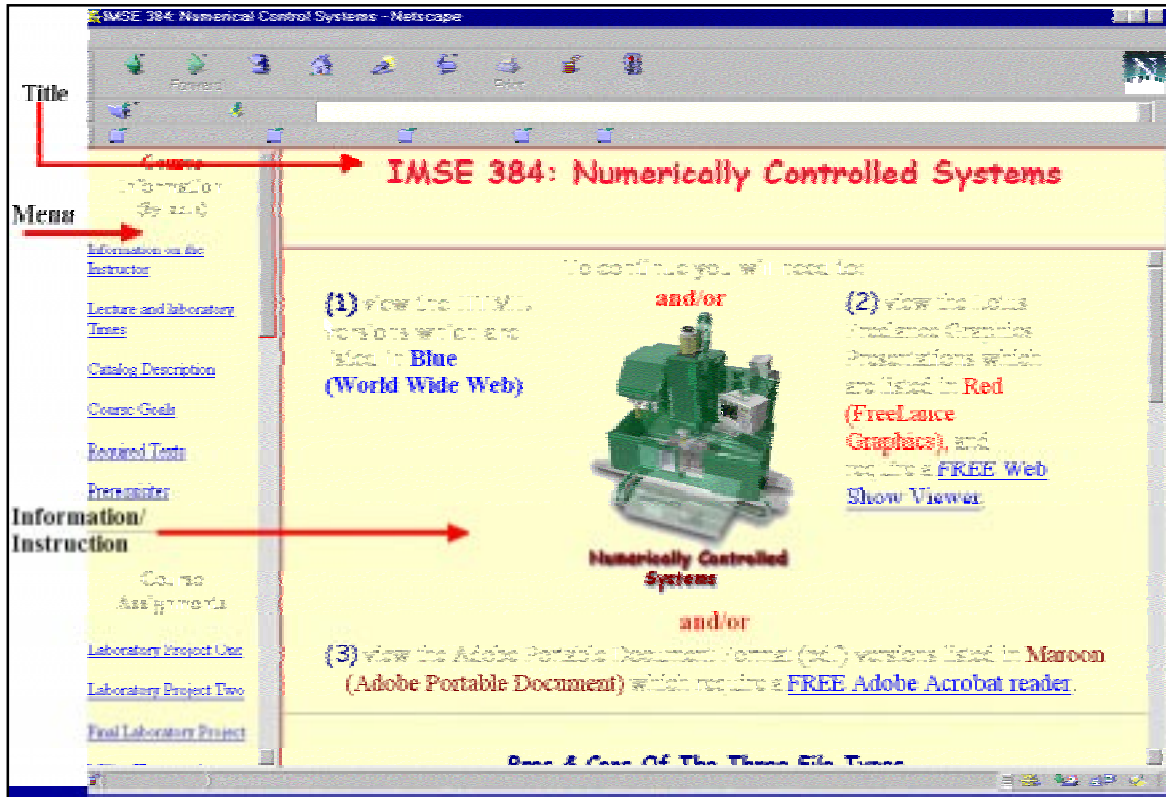


Figure 1: Three frame opening page for IMSE 384, Numerically Controlled Systems

The title frame informs the user which course has been accessed while the information/instruction frame provides data about course content formats, some of which require free browser plug-ins. The lecture content may be viewed as standard HTML, Lotus Freelance Graphics or Microsoft Powerpoint presentations, or in Adobe Portable Document Format. Lotus, Microsoft and Adobe provide free viewers and browser plug-ins for their products. The information/instruction frame provides links to locations where these additional plug-ins can be downloaded. Where more than one format is provided to view the same content the pros and cons of each format is provided so that the student may decide how to best view the course with his/her computer and operating system.

The navigation menu provides access to the following course modules.

- Syllabus

- Course Assignments
- Course Schedule and Lectures
- Course Discussion Group and Guest Book
- Course Grade book

The menu changes to reflect the users current selection. The course schedule menu provides access to all of the lecture material (course content) as well as the course schedule. The course grade book and course discussion groups, e-mail links, and main menu links are available on all menus allowing the user to freely move about the course material.

TECHNOLOGY-MEDIATED INTERACTIVE COMPONENT

One of the main problems in Internet based education is how to engage the student in activities that foster learning. To date no method has been presented that does not have weaknesses that can justifiably be criticized for one reason or another. This author has decided to use web based quizzes that provide instant feedback. The purpose of the quiz is not for the instructor to evaluate the student's subject knowledge but rather provide a means for the student to measure his/her own understanding of the subject and identify areas that need improvement.

All the quizzes are written in javascript. This provides a major problem in using the quizzes to evaluate the student. Because javascript is executed on the users computer rather than on the web server the entire quiz, including the answers are available to anyone taking the quiz. The user can simply use the browser "View Source" command and with a little effort look up the answer to each question. It is possible to move the source code to the server and create a more secure quiz or test if that is you intention but you still have to face the issue of controlling other forms of cheating. The author decided it is more important to provide the student a self evaluation mechanism than to provide self grading quizzes and exams.

The image shows a screenshot of a web-based quiz interface. The page title is "Numerical Control Systems". The interface includes a header section with course information, a student identification section, a question section, a response field, a help button, and a grade/response section. Annotations with arrows point to various elements:

- Student Name and ID Number:** Points to the "Student Name" and "Student No:" input fields.
- Question & Answers:** Points to the question text and the multiple-choice options.
- Field for graded response:** Points to the text input field where the user enters their answer.
- Button for additional help:** Points to the "Help" button.
- Grade & response buttons:** Points to the "Mail instructor Quiz" and "Start Quiz" buttons.

The quiz content includes the following text and options:

Course Name: Numerical Control Systems
 Course No: 1810-1141
 Quiz No.: 11111111 One
 Teacher: Dr. Eliezer Agler
 Password: Some Output Group of Some good and beautiful
 Teacher's Email: eliezer@univ.edu

Student Name:
 Student No:

No. of Questions = 4, Remaining = 3/4

You can press the blank button at the bottom of the page to have the quiz marked

1. What is the command to use raster compensation "G00"?

G040
 G041
 G042
 G043
 G044

2. What is the average cutting speed (in feet per minute) when using a high speed steel tool to machine a tough material?

100 feet per minute
 150 feet per minute
 200 feet per minute
 250 feet per minute
 300 feet per minute

Mail instructor Quiz Start Quiz

Your mark is %

Figure 2: Example electronic quiz

In order to create the quizzes used in this course the author purchased a software package called "QuizPlease" which operates under Windows 95. QuizPlease allows the author to create a data base of questions cross referenced to as many key words as desired. From this data base the author can create quizzes or exams based on subject mater, degree of hardness or any of the other key words desired. Questions may be selected at random based on used input or by specifically selected questions. QuizPlease then generates the HTML code and javascript for the quiz page and exports it to your server. This frees the author from the burden of learning both HTML and javascript. QuizPlease has versions for server and client installation.

TECHNOLOGY-MEDIATED COLLABORATIVE COMPONENT

The discussion group and guest book in these courses provide the students with a means to communicate with the instructor and each other to share insights. This feature is intended to provide the distant (and/or shy) student the ability to engage in group discussions that normally occur in the traditional classroom. The other major use is to allow students who are physically separated to act and function as a team. This feature is more important in the graduate course because it has students from Europe, Canada, Mexico and about 30 of the U.S. States.

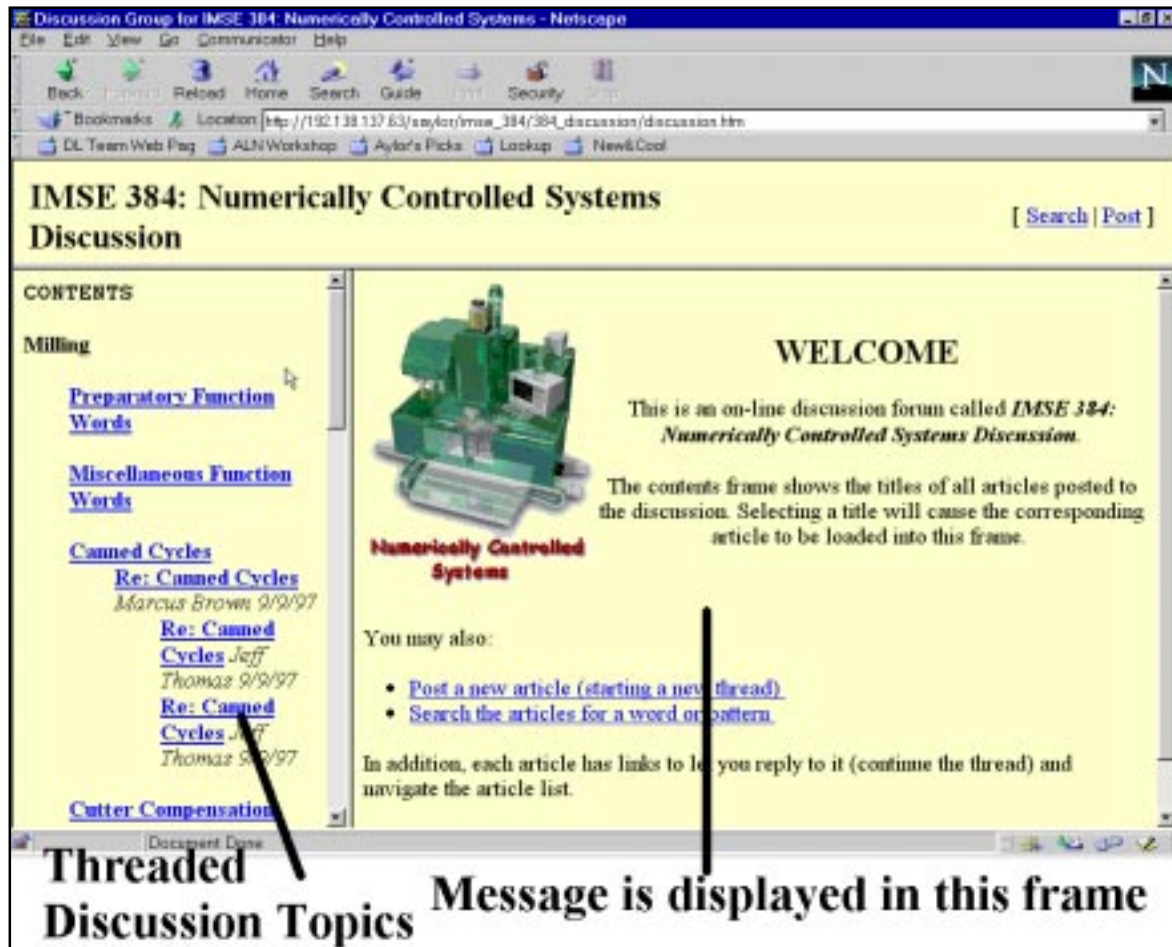


Figure 3: Numerically Controlled Systems Discussion Group

The discussions generated are moderated by the author. If unsuitable or undesirable comments are posted the instructor can remove them and inform the offending author of the nature of his/her offense. With the instructor acting as a moderator rather than a lecturer the students tend to develop better relationships with each other and some students tend to contribute more than in a regular classroom. The author has found that electronic discussions require an initial effort on the part of the instructor to get the discussion started. In the courses presented here an initial set of discussion topics were selected by the author and students were instructed to contribute to them. Once the discussion is started the instructor can monitor the discussion and guide it in the direction desired. The intent of the discussion group is to move the instructor from the position of information dispenser to that of a learning facilitator.

The discussion groups were created with Microsoft FrontPage 97 and later updated with Microsoft FrontPage 98. FrontPage was selected because it does not require a separate discussion server or specially written Common Gateway Interface (CGI) scripts on the web server. This provides the author complete control over the number, the content, and the look and feel of each discussion group used.

MANDATORY AND OPTIONAL LEARNER PARTICIPATION COMPONENT

This is the item that has required the most effort. The author has placed his complete set of lectures on the server in three formats. Homework assignments are also provided provided and collected via the Internet.

All the lectures are created in either Lotus Freelance Graphics or Microsoft Powerpoint. Both of these products will publish their presentations to the Internet in standard HTML (with or without frames). They both provide free browser plug-ins to allow their presentations to be viewed inside a browser across the Internet. Free viewers which allow the presentations to be viewed from the local hard drive on Windows 95 computers are also available, saving the student the cost of owning the full program.

The third format provided is Adobe Portable Document Format (PDF). With the purchase of Adobe Acrobat Pro creating the PDF format is just a matter of printing to a PDF printer driver rather than a regular printer. Adobe provides free viewers for every major computer operating system which allow users to view PDF documents on their local hard drives or as across the Internet as a browser plug-in.

The use of three formats allows the students greater flexibility in accessing the material while only requiring an additional 5 minutes per lecture. For a more complete description of the pros and cons of each format see the opening page of one of the courses.

(http://dlteam/saylor/imse_384/start384.htm or http://dlteam/saylor/imse_682/start.htm)

Figure 3 shows various versions side by side to provide an idea of the differences.

In addition to the lecture material the students also participate in homework. It is a simple matter to provide homework assignments on the web page. What the author has done is to provide a web form that allows the students to turn in completed homework via electronic mail. The advantage here is that the author controls the format that all homework is received in, simplifying grading.

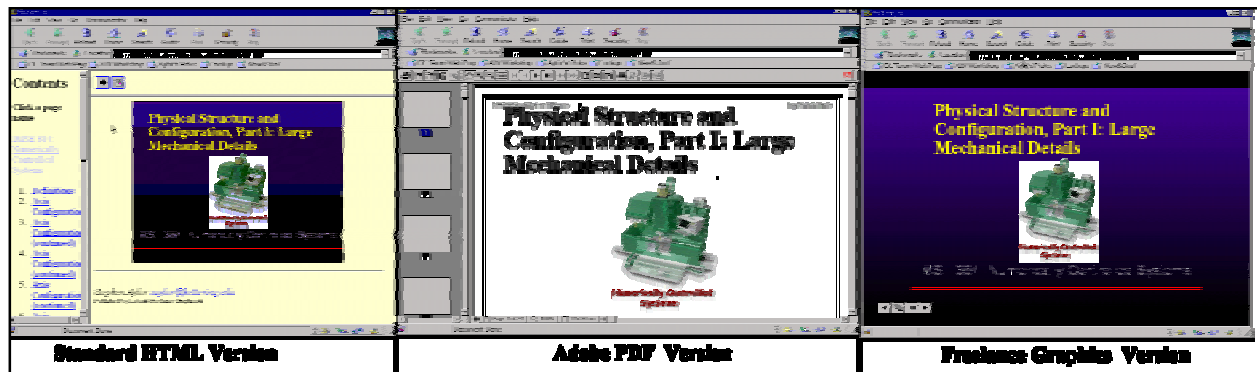


Figure 3: HTML, PDF and Freelance Graphics format samples

Figure 4 below shows an example of a homework submission form. When the student has completed his/her homework and clicks on the submit button a confirmation screen shows the student what was sent and a formatted copy is delivered to the instructor as a text file.

You should use the following form to submit your work.

Name (Last, First):

Homework Problems:

Student ID #:

Act. Program:

Problems or General Comments:

Homework Submission Form

Figure 4: Homework submission form


```
*****
Homework : Milling Homework Problem One
Name:      ASEE Homework Sample
Homework:  Milling Homework Problem One
ID #:      123-23-1234
Bl:        Submit
Date:      2/11/98
Time:      5:05:39 PM
Remote Name: 192.138.137.10
Remote User:

Part Program:

%
N010G70
N020G90
N030G94F3000
N040G17
.
.
.
N490G1Z5000M5
N500G0X0Y0Z30000
N510M30

Problems - Comments:
```

Figure 5: Sample formatted homework

The data collected and reported to the instructor has information that is not provided by the student such as date, time and the submitting computers IP number. This allows for some minor monitoring and tracking such as was the homework submitted on time, did two or more students submit homework from the same computer with in minutes of each other. These minor checks will not eliminate cheating but may help in reducing the potential problem.

EFFORT AND RESOURCES REQUIRED

The creation of these two courses required approximately 2000 man hours. Most of that time was devoted to learning and experimenting with HTML formatting. Learning how to effectively create and use tables, frames and forms required more time and effort than creating the course content. With the advent of software packages such as Microsoft FrontPage and QuizPlease the need to learn how to manipulate HTML code to correctly format tables, frames and forms has disappeared. Today creating an on-line asynchronous course requires little more time and effort than creating a course for a regular classroom.

Resources used in the creation the above courses included two HTML editors, Microsoft FrontPage (\$49) and Qualcomm Homesite (\$40). FrontPage is a graphical editor best suited for

the creation and management of entire web sites while Homesite is a text based HTML editor best suited for creating and editing individual pages but can be used to create entire web sites.

Lotus Smart Suite 97 (\$100), Microsoft Office Professional (\$190) and Adobe Acrobat (\$50) were used for the creation of the course content. Both Lotus and Microsoft allow the creation of web pages from within their products thus allowing normal class preparation efforts to be published to the Internet. Adobe Acrobat installs and acts as a printer. Just print your lecture to the Adobe driver. One professor at Kettering (Tom Mase) is using Adobe Acrobat and a scanner to create electronic versions of his hand written notes and homework solutions further reducing the time required to create course content.

Hardware required for the creation of these courses included a Pentium computer with Windows 95, a Hewlett Packard 4C flatbed scanner, and a Casio CV-100 digital camera. Cost can range from \$2,500 to more than \$7,000.

REFERENCES

- [1] N. Al-Holou and N. Bow, "Development of a Computer-Based Instruction In Electromagnetism", ASEE North Central Section Conference Proceedings, Vol. 2, April 1997, pp 282-286
- [2] J. Sener, "What is a Good ALN? A Practitioner's Perspective", Third International Conference on Asynchronous Learning Networks, October 1997, <http://www.aln.org/conf97/proceedings.htm>

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