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ABSTRACT

There are a number of issues that must be addressed when delivering courses entirely online, such as designing effective user interfaces, using the visual medium of the World Wide Web effectively, and modifying traditional instructional methods. This paper discusses the design, development, implementation, and evaluation of an online course at Eastern Illinois University. The majority of instructor/student interactions were done electronically; most student-to-student interaction occurred through e-mail or the telephone. Given the visual nature of the virtual course, instructors need to think visually while at the same time understanding the current limitations of the medium. To maintain interest in electronic dialogue, instructors should use written language in a skillful way, including humor and metaphor. Other guidelines include using short concise sentences, lowercase letters, uniform text spacing, and effective headings and white space. In developing course materials for the World Wide Web, instructors should also: present a sensible ordering of information by topic; categorize links as essential or supplemental; create a consistent navigational design; keep documents as brief as possible; and provide a linear pathway. For example, browser "frames" enable several Web documents to be opened simultaneously in the computer screen area, which can help circumvent disorientation. Sound principles of visual design can improve the aesthetics of online materials, their organization, and their effectiveness. (AEF)

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Virtual Courses And Visual Media

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Abstract

There are a number of issues that must be addressed when delivering courses entirely on-line such as designing effective user-interfaces and using the visual medium of the WWW effectively for instructional purposes. This paper discusses the implementation of a on-line course and reviews issues related to the visual design and development of instructional materials for use on-line.

Introduction

The Internet and the World Wide Web (WWW) are greatly impacting education. The vast network of networked computers known as the Internet enables, among other things, access to a worldwide database of information in a variety of mediated forms.

The accessibility of information over the Internet affords educators many advantages and challenges in terms of instruction and learning. The advent of the WWW enables the distribution of on-line courses and entire degree programs. Class materials can be made available 24 hours a day from anywhere in the world. This makes it possible for learners to enroll in courses regardless of their physical location.

What is a Virtual Course

A virtual course is a learning experience delivered within a computer-based information system. There are no walls or chalkboards but rather work environments; facilities and group communications are facilitated through software and hardware (Hiltz, 1995). Instructors and students can be in non-centralized locations so that instruction is distributed independent of time and physical distance. Consequently, students do not travel to the university or college but participate by interacting with a personal computer connected to the Internet. Course content can be accessed at any time from any location in the world.

The virtual classroom is comprised of many of the same learning tools and forms of interaction that occur in the traditional classroom. "All of these things exist within the virtual classroom, too, except that all the activities and interaction are mediated by computer software, rather than face to face interaction." (Hiltz, 1995 p. 5)

Virtual courses are typically asynchronous which means that there is no prearranged time or place of meeting. Synchronous learning occurs when the instructor and students agree to meet at a particular time and place to engage in some form of learning activity. Most traditional instruction takes place synchronously. Asynchronous learning, on the other hand, typically provides information and instructional materials which are accessed at a time and place that is convenient to the student. For example, when the WWW is used to present a lesson, instructional materials and activities can be made available for students to access at any time, from any location in the world provided that they have the appropriate hardware and software.

It should be mentioned that not all instructional uses of the Internet and WWW are courses delivered completely on-line. Many instructors utilize web-based materials to reinforce, supplement and compliment information presented during in-classroom lectures.

Purpose of Paper

In the Spring semester of 1995, Eastern Illinois University offered "Technology in the Classroom" (EDF 4998) as a "virtual course". The course emphasized various aspects related to the theory and practice of technology and media (specifically computers) for learning. It focused on relevant issues related to the design, development, and evaluation of computer-based learning programs. Instructional communications among students and instructor were done asynchronously via the Internet.

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There are a number of issues that must be addressed when delivering courses entirely on-line such as designing effective user-interfaces and using the visual medium of the WWW effectively for instructional purposes. This paper discusses the implementation of an on-line course, EDF 4998, Technology in the Classroom. It reviews issues related to the visual design and development of instructional materials for use on-line.

Course Overview: Interactions

There were four primary means by which the instructor, student, and peer-to-peer interactions took place in EDF 4998: 1) electronic dialogue via email and listserv, 2) the WWW, 3) the telephone, and 4) the postal system. Most information disseminated from the instructor to students occurred by electronic mail and the WWW. Each week lecture notes were delivered over the WWW, the purpose of which was to illustrate concepts and ideas, summarize topics, pose questions, and present assignments. Students reviewed these materials at a time convenient to them and responded with reactions, comments, and questions through electronic mail.

Students turned in weekly assignments which were sent to a listserv for the entire class to review and discuss. The final exam and other confidential assignments were sent directly to the instructor by electronic mail. A few students opted to send some of their major assignments through the postal system.

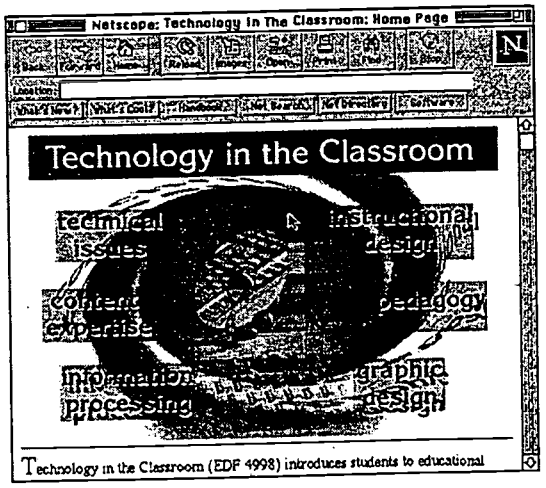
The majority of interactions between instructor and students were done electronically. Occasionally, students used the telephone for personal questions and comments (e.g., not being able to complete work by the assigned deadline, etc.) but this was limited.

Most student-to-student interactions occurred through electronic mail and by telephone. The telephone was particularly useful in emergencies. For example, to complete a group assignment, two students had not received email from their partner in two days and thus telephoned to inquire as to his whereabouts.

Modifying Materials

Conventional expository instruction in which the instructor is the primary disseminator of information is not always effective for on-line courses. Adapting instruction to the virtual course requires modifying traditional instructional methods and media. Much of the electronic dialogue that took place in EDF 4998 was conducted through facilities such as email and listservers. The WWW was used for weekly lecture notes, assignments and projects. These media forms are visual in nature and using them to facilitate interactions and convey course content requires, among other things, a clear understanding of how to convey information visually. Figure 1 below shows the home page for EDF 4998.

Figure 1
EDF 4998 Home Page



Electronic Dialogue

One of the most important factors which determines whether students perceive the virtual class to be better or worse than traditional instructional modes is the extent to which they interact and the quality of their interaction (Turoff, 1995).

The mode of interaction and the interface between instructor and student is much different in a virtual class. For example, instead of listening to the instructor, students navigate through computer-mediated content and exchange electronic dialogue. In a traditional class, student questions can be managed effectively with verbal responses but in the virtual class this dialogue must be typed, a far more laborious task. Posing a question verbally requires less physical effort and time than if the same question was typed.

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Moreover, when a message is typed it has a degree of permanence compared to a verbal message which diminishes after the words are spoken. Consequently, an author may exert more time and effort composing his/her thoughts for a typed message than one that is conveyed verbally. Also, the nature of the virtual course is such that responses to questions do not have to occur immediately. This may promote a tendency to spend more time and energy reflecting and developing elaborate responses.

The virtual classroom enables students to ask questions privately and at any time of day or night. Students who would never venture to speak out in a traditional classroom may be inclined do so under these circumstances. This combined with the fact that most dialogue is sent electronically produces a large amount of electronic mail. If 20 to 30 students enter a minimum of 5 questions or comments a week plus assignments, the number of entries per week grows substantially.

Guidelines For Electronic Dialogue

Unless the course requires a specific email application, instructors may not be able to control, to any great extent, how students' electronic messages appear visually. The type of programs used for receiving and sending mail will vary from student to student. Nevertheless, there are some things that instructor and students should keep in mind.

To maintain interest, instructors should use written language in a skillful way including the use of humor and metaphor (Turoff, 1995). Students should be encouraged to do the same. This applies to both email and WWW materials. The dynamics of class interactions will change dramatically when creative dialogue is shared. For example, in one class a student constantly interjected colorful analogies and examples. As a result, other students began to react to his colorfulness. While this dialogue was not always related to course content (in the instructor's opinion) it helped build class cohesiveness.

When possible use short concise sentences and simple vocabulary (Hartley, 1985). Remember students will be reading a lot of information.

"For best legibility, use lowercase letters, adding capitals only where normally required." (Heinich, Molenda, Russell, Smaldino, 1996, p. 76). Often instructors and students type electronic messages in upper case. This should be avoided not only because it is more difficult to read but also, depending on the nature of the message, capitalization is often associated with "shouting" on the Internet.

Text lines should not be too close together or separated too far apart (Heinich, Molenda, Russell, Smaldino, 1996). Some students will place a blank space between each typed line. This can make the text lines appear disjointed and difficult to read.

Use headings and whitespace effectively. When students submit an assignment electronically, they may be more informal than if it was submitted on paper. For instance, terms might be abbreviated or less formal language used. Also, the appearance of documents may not be comparable to those submitted on paper. There is often the tendency to send electronic documents (e.g., mail messages or assignments) as a single block of text. While this is not a problem for short email messages, it is problematic as text documents get longer. In the virtual class, students need to organize information with descriptive headings and text segmented by whitespace.

Because so much electronic dialogue is exchanged, instructors should encourage students to identify themselves as the author of the information submitted. At minimum, request that students type the following at the beginning of each document:

From: Student's Name
Topic:

This helps instructors identify the author of the assignment and prevents documents form being lost or deleted.

The World Wide Web

In addition to electronic mail, the WWW is another primary means by which to disseminate information in the virtual course. The WWW like other hypermedia environments, frequently contains documents designed as scrambled, content-free information or gibberish (Stanton & Baber, 1994). While technologically web site developers have the capability to include pictures, text, audio and video in documents, design protocols for doing so differ from one site to the next. This confuses users and increases the possibility of users getting disoriented. As the number

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of nodes and the complexity of their links increase, it is not unusual for the users of a complex hypermedia program to get lost (Park, 1991).

The level of frustration and disorientation users experience when viewing web-based instructional materials is often contingent on an intuitive user interface and the user's familiarity with the WWW. Depending on the nature of the virtual course, student skills may range from novice to expert. It is especially important for the novice that WWW documents be effectively designed and that the interface be intuitive. Well designed documents that have a clear and uniform user interface enable students to navigate content more easily (Knupfer & Clark, 1996).

In the virtual course, peer-to-peer interactions and instructor-to-student interactions are generally on-going and not limited, for example, to a 1 hour block of time as in a traditional course. In most cases, students and instructor exchange dialogue at all hours of the day on a daily basis. While such dialogue is on-going, it is often not immediate. A student may pose a question, idea, or comment and not receive a response for hours. This is one reason why every attempt should be made to reduce interferences to instructional content (e.g., poorly designed interface) and frustration to the learner. If students become disoriented by WWW documents or do not understand how to access content, they may not be able to find a solution for several hours which can increase their anxiety and frustration.

In developing course materials for the WWW, there are several things to keep in mind. The items discussed below are some basic suggestions that virtual instructors may find useful.

Present a sensible ordering of information by topic. Learners often visually scan WWW documents without reading detail and thus need a means by which to easily locate necessary information. Instructors should provide a good visual overview that allows students to quickly find a particular topic or document. Provide a topic listing or table of contents, a hierarchy of topics, or a means by which to search for a topic. Where possible, create conceptual maps for instructional content. Maps illustrate node and link relationships and provide a visual guide to the to-be-found information. Maps also demonstrate structural knowledge or how a particular topic or concept is structured relative to other topics and sub-topics.

WWW documents often present numerous options/links from which to choose. This can confuse learners and make it difficult for them to decide where to go next. To address this issue categorize links into two major groups: 1) essential links which lead to essential information, and 2) supplemental links which provide related but divergent information. An example could be a hypertext version of a technology textbook. Links that lead from page one to page two or from chapter 1 to chapter 2 are essential links. References or citations on a particular topic, author or experiments are supplemental links.

Create a consistent navigational design that enables students to easily obtain documents that relate to the document being viewed. This can be done by providing access/links to the original table of contents or main home page. Another technique is to designate a portion of the screen (top and/or bottom of screen) for navigational elements. In this area, position links that relate to the document being viewed.

Do not make documents longer than necessary if they can be segmented into more then one file. The length of time involved in retrieving long documents can be considerable depending on users' hardware. Students in the virtual course often have modem access and therefore it takes them longer to download WWW documents. This problem is compounded when graphics and pictures are added.

Much like electronic mail, long documents can be visually overwhelming to users. Instructors need to reword or abbreviate text so it will fit within the visual design of the screen (Knupfer & Clark, 1996). Additionally, reading a computer screen is more difficult than reading from paper. It is preferable to use larger font sizes (e.g., size 4 in HTML coding)for easy reading.

While WWW documents are non-linear, readers often read them linearly. Thus, it is a good idea to provide a linear pathway through documents. This could be accomplished by providing links that allow users to proceed from one screen or topic to the next. (Tilton, 1996).

Users make navigational decisions based

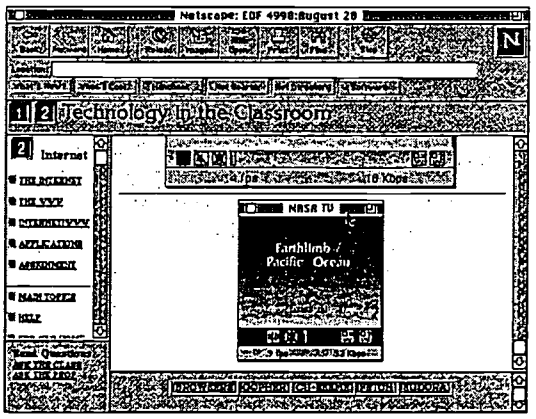
on informational content. They read the text on-screen and made inferences as to where they might find more related information. Visual cues and navigational links should support and/or coincide with the informational content. Descriptive heading, titles and links are important during information searches.

Using Frames

It is a challenge for instructors to create well-designed web-based instructional materials. Among other things, the computer screen restricts students' view of the overall instructional content (Knupfer & Clark, 1996).

Frames enable several web documents to be opened simultaneously in the computer screen area. Each document is apportioned a segment of the screen for display. From the experience in EDF 4998, frames served two primary functions. First, they helped to visually organize information. Second, frames enabled consistent visual referents (e.g., menu selections) to be used which assisted user navigation. Figure 2 below shows an example of a screen using frames.

Figure 2
Frames: Sample Screen



Typically in WWW documents, a user makes a selection and is taken to a document in which a new screen of information is presented. Information at the previous location is no longer visible. Commonly, users of the WWW make selections superficially and when arriving at the destination document, they no longer remember their previous selection. As the amount and complexity of information increases, confusion may result. This has implications for virtual courses. It is important for students to understand the paths through which they traverse instructional content. When students become confused or disoriented or do not know how they arrived at a particular destination, they will be less likely to acquire the presented information and more likely to become confused.

Using frames in WWW documents can help circumvent this problem. For instance, imagine a document divided in to 3 separate sections. At the top of the screen, a one inch "Title" frame contains the title of a particular week's lesson. On the left side of the screen, a two inch wide "Menu" frame lists topics for the week. The remaining portion of the screen is the "Content " frame used for the presentation of instructional content. When users selects any of the links in the Menu frame, information displayed in the content frame changes. The Menu does not change. Therefore, students are provided a constant visual referent to the week's topics and the sequence in which they are organized and presented. Students can navigate across instructional content without loosing sight of how to get back to the Menu list or how to select a new topic.

Summary

The Internet and the World Wide Web offer many new opportunities for educators. This is a medium by which learners have access to information around the world 24 hours a day. The classroom as we have known it is expanding to world-wide proportions. Classes can link to other classes at distant universities to exchange ideas, solve problems and discuss various topics. Likewise, regardless of physical location, scholars and business professionals can, with relative ease, enter the classroom to share perspectives and knowledge.

The virtual course is visual in nature. Typically no verbal dialogue is exchanged between instructor and students. Most communication is done visually through the WWW and text messages using electronic mail. Given the visual nature of the virtual course, instructors need to think visually while at the same time understanding the current limitations of the medium. While graphics and pictures may, for example, be more effective at conveying meaning than long scrolling screens of text, too many

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pictures cause problems for students accessing class materials through a modem.

Despite current limitations, the Internet and the WWW hold great potential for instruction and learning. As educators become involved with the "virtual course" it is important to remember that it is a visual medium. Sound principles of visual design can improve, among other things, the aesthetics of on-line materials, how they are organized, and their effectiveness at conveying course information.

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