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Can Web-Based Instruction Foster Information Literacy?

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A Web-based distance learning course developed with World Wide Web Courseware (WebCT) is the focus of this article. The course, Advanced Reference: Online Searching Techniques, concentrates on assisting students in developing information literacy skills. Results from a study of the pilot course indicated that (a) participants' attitudes toward Web-based instruction are positive, and (b) Web-based instruction provides a learning environment in which participants can develop electronic literacy skills and share their ideas and projects. Building on the findings of the study, the course was modified and updated to take advantage of the enhancements in a new version of WebCT. The second iteration of the course incorporated Web-based activities to strengthen the information literacy competencies of the participating students. The unique capabilities of Web-based delivery in combination with sound instructional design guidelines created an active, learner-centered experience for the participants.

Introduction

Collaboration, leadership, and technology are seen as the underlying themes for guiding the school library media specialist in developing an effective, student-centered program (Hopkins, 1999). The three themes are intrinsically interrelated. To collaborate and lead effectively, media specialists must possess the information technology skills essential for providing aggressive information literacy education. The abundance of information and the complexity of new information structures require that people be information literate.

What knowledge and competences does an information literate person possess? The California Library Association (1996) characterizes the information literate person as one who has knowledge of the four sub-literacies of information literacy: (a) literacy in reading and writing; (b) computing literacy (managing the enabling technologies and productivity software); (c) media literacy (creating, manipulating, and integrating various media including images, sound and video); and (d) network literacy (finding and retrieving globally distributed information). In order to provide information literacy education, librarians must possess the competencies of the four sub-literacies. In addition, librarians must master the processes required to create instructional resources and to teach the four sub-literacies to a largely unprepared populace (California Library Association, 1996).

Information literacy requires information access skills, that is, knowing how to locate information in varied formats; and knowledge management

skills, that is, how to use and evaluate information to construct meaning and value from information. In order to plan collaboratively with teachers and to be recognized as instructional leaders, school library media specialists should have the competencies to guide and assist others in becoming information literate. The power to create communities of learners who are able to share information, ideas, and projects begins with enabling teachers and students to use technology as part of their daily educational experiences.

Courses for school library media specialists should provide varied opportunities to develop information literacy competencies. According to Sarah Long, the President of the American Library Association, "A clear statement of the required skills and competencies is key to how we define our profession" (American Library Association, 2000, p. 8).

These thoughts and the definition of information literacy from the California Library Association helped delineate the objectives (see Figure 1) and influenced the development of a Web-based course, ELMT 8370, *Ad-*

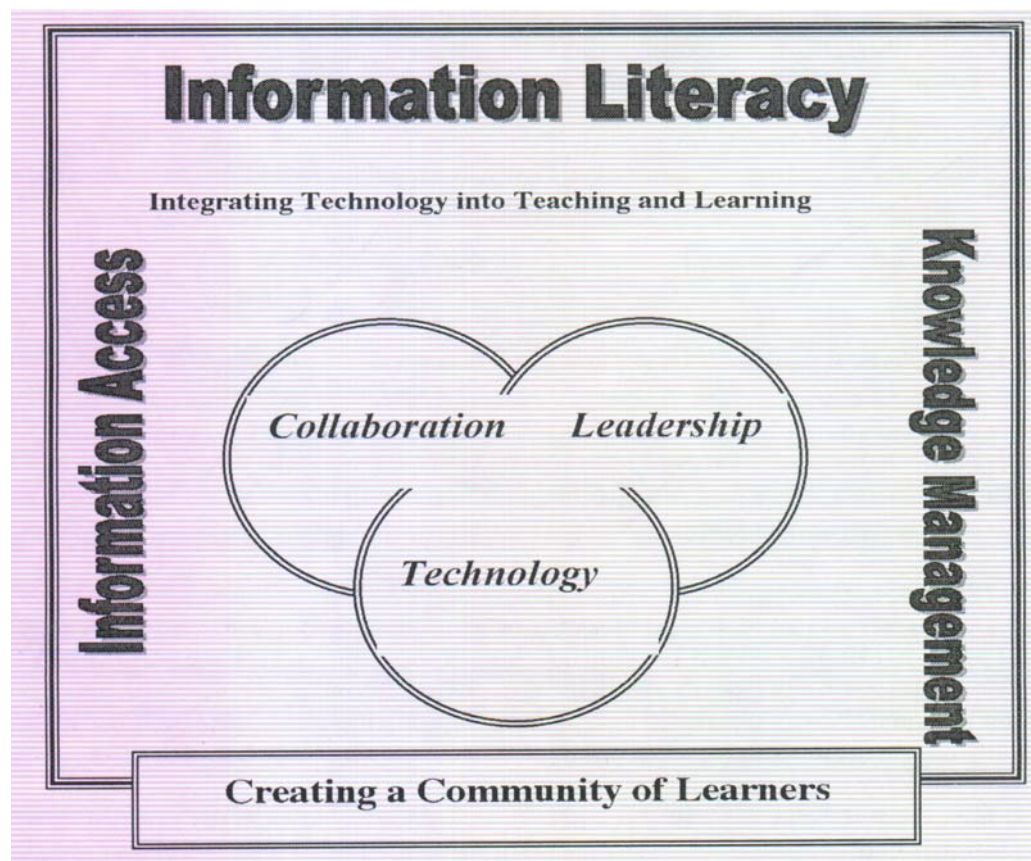


Figure 1. Graphical representation of course objectives: ELMT 8370 (spring 2000).

vanced Reference: Online Searching Techniques. The course is a requirement for practicing school library media specialists in the Educational Specialist Program in Library Media Technology at Georgia State University in Atlanta. The course had traditionally been taught on campus. In the spring of 1999 it was offered as a pilot distance learning course.

World Wide Web Course Tools (WebCT) provided the course management and delivery system employed to make the course available in a distance learning environment. Web-based instruction is viewed as an innovative approach for delivering instruction to a remote audience, using the Web as the medium (Khan, 1999). Piloting the course offered the instructor an opportunity to evaluate the course and determine if Web-based distance learning was a feasible and effective means of delivery for this particular course content. Using the data gathered during the study of the pilot course, the course content, assignments, and features were revised. The course was offered again in the spring of 2000, and 11 graduate students participated in the second iteration of the course. The results of the evaluation of the pilot course were previously published (Hindes, 1999); this article discusses the work done subsequent to the study.

The Study of the Pilot Course

The purpose of the study was (a) to evaluate the use of a Web-based course tool to deliver instruction dealing with online search strategies, and (b) to determine if Web-based distance education was an effective means of helping school library media specialists develop the skills needed to successfully model information literacy skills for teachers and students. The research questions were:

- Is Web-based course delivery an effective way to prepare school library media specialists in the instructional uses of Internet information resources?
- Is Web-based instruction a successful medium for helping school library media specialists develop skills in searching and evaluating the Georgia Library Learning Online (GALILEO) databases?
- How do participants react to Web-based instruction?

Research Design and Methodology

The study employed the techniques and methods associated with qualitative research. Qualitative research uses a naturalistic approach that seeks to understand phenomena in context-specific settings. Purposive sampling is based on the assumption that the researcher wants to discover, understand, and gain insight regarding a phenomenon; therefore, the researcher selects a sample, a group of participants, from which the most can be learned (Merriam, 1988). For this study, the participants were the graduate students taking the pilot course.

Three types of sampling error can occur in qualitative research. The first relates to distortions caused by insufficient breadth in sampling, the second

from distortion introduced by changes over time, and the third from distortions caused by lack of depth in data collection (Patton, 1990). The study of the pilot course was limited by the first, breadth in sampling. A limitation of this study is that there were only three graduate students in the course. Knowing that the enrollment in the Educational Specialist Program would significantly increase the following year, the course was offered despite the small class size. This afforded an opportunity to pilot the course before officially listing it as a Web-based distance education course.

Data Collection

The sources of data were logs from the synchronous chat area, bulletin board postings, e-mail communications, course usage statistics, students' projects and assignments, and a focus group session. Collection of data took place throughout the 15-week semester. Each chat session was approximately two hours in length. Because WebCT automatically saves a log of the sessions to the chat directory, entire transcripts of the discussion sessions were available for data analysis. Students were able to access the chat log archives (see Figure 2) from the WebCT home page for the course.

The data in qualitative research encompass the events in the environment being studied, the phenomena being observed, and the perceptions of the participants. Meeting on campus for the final session, the group discussed the course content and the technical issues involved in accessing Web-based course. Thirteen focus questions guided this discussion. The session was audiotaped and provided additional data for analysis.

Data were sorted into categories depending on what themes, words, behaviors, patterns, or other phenomena emerged. Certain tentative themes began to emerge early in the analysis of the data. The categories changed, or were dropped, depending on whether new data supported or contradicted the direction of the categories. The initial research questions guided the classification of the themes.

Results

The first research question asked: Is Web-based course delivery an effective way to prepare school library media specialists in the instructional uses of Internet information resources? Web-based course delivery is reasonably the

January 26 Chat	February 9 Chat	February 16 Chat	March 2 Chat	March 16 Chat
March 23 Chat	March 30 Chat	April 6 Chat	April 13 Chat	April 20 Chat

Figure 2. Chat logs for ELMT 8370 (spring 1999).

only way this course should be offered. A Web-based learning environment allowed the students to explore online reference resources available on the Internet. They developed powerful search strategies and clearly demonstrated their ability to locate and use the information they retrieved. Creating guides in the form of Web pages allowed the students to synthesize and share their knowledge with others. The objectives of the course were achieved. The course could be offered in a computer lab with Internet access, but the experiences would be different. The participants agreed that the topic of the course and the instructional delivery were decidedly matched.

The second research question asked: Is Web-based instruction a successful medium for helping school library media specialists develop skills in searching and evaluating the Georgia Library Learning Online (GALILEO) databases? In Georgia, locating information is facilitated by the Georgia Library Learning Online (GALILEO) initiative. GALILEO is a World Wide Web-based virtual library (<http://www.galileo.peachnet.edu>) that provides access to multiple information resources, including secured access to licensed products. Institutions that participate may access over 100 databases that index thousands of periodicals and scholarly journals. Over 2,000 journal titles are provided in full text. The databases featured in GALILEO are subscriptions purchased from a number of different vendors; nonetheless, GALILEO provides a common gateway to these databases. Other resources include encyclopedias, business directories, and various government publications.

Although all the students had used GALILEO before enrolling in the course, they developed additional search strategies related to refining and narrowing their searches. One student had always used the ERIC databases, but was unaware of the availability of the full-text articles available in the Periodical Abstracts (Periodical Abstracts Research II at ProQuest) and EBSCOhost databases. Electronic mailing of citations and/or full-text articles was another new area for two students. Students limited searches to publication types such as editorials, software reviews, ethnic recipes, and so forth. Participants had a much easier time locating information in the proprietary databases in GALILEO, as opposed to trying to locate information from Internet sites.

The third research question asked: How do participants react to Web-based instruction? The participants had positive attitudes toward Web-based instruction in general. Eliminating the time spent driving to class and back was considered a big advantage, and students loved being able to communicate from home. On another level, they missed seeing each other. A significant amount of time was spent socializing, checking up on one another, and discussing their day jobs. Some additional comments concerning the delivery system follow:

I have enjoyed using WebCT in the class. The interface, links, and icons are clearly presented and appear to be functioning properly. I sincerely have no complaints with regard to the application or its interface.

I think WebCT is a wonderful way for the instructor to share information with the students in an asynchronous manner. I even think the chat room is a great place for students to meet and work on a project (it beats those 2 o'clock on Sunday afternoon meetings at the library hands down!). But I think extended and regular distance learning segments are better held in voice-permissive environments such as video conferencing or tools like NetMeeting. An advantage I can see WebCT having over these two methods is the archive function that saves the full chat (but then again, NetMeeting has a chat feature and an archive function).

Discussion of the Study Results

Several important themes emerged from the data gathered during the study of the pilot course. The students thought the content and the delivery system were well matched. Their ability to locate electronic information was clearly confirmed, and the projects they uploaded to the student presentation area demonstrated their ability to instruct and guide others in retrieving and using electronic information. The chat logs revealed that students needed time to communicate about matters other than the course content. Students indicated that they missed face-to-face social interaction with each other. They also expressed concern about the different levels of expertise that future students might have when entering the course, and suggested additional instructional time be provided for those who needed help in developing some basic technology skills, especially Web-editing skills.

Redesigning the Course

In the spring semester of 2000, the course was offered again. A new version of WebCT was available, and the course was redesigned to incorporate these enhancements. Assignments were altered to reflect the changes in course objectives, objectives that reflected a commitment to participants' developing information literacy skills. Time spent in the chat area was reduced, whereas time for developing Web-based projects was increased.

Incorporating the Enhancements to WebCT

One enhancement to WebCT was the "My WebCT" page. This provided the option of accessing all WebCT courses through one global id and password. The My WebCT page allows students to access multiple courses from one location on the WWW. The My WebCT page automatically notifies students of upcoming due dates for assignments, new e-mail messages, and new bulletin postings. By selecting these hyperlinks, students are automatically taken to the location in the course where these new assignments, messages, or postings are located. This feature allows students an easy way to check on course updates. Although the university supported the older version of WebCT (and in fact discouraged faculty from upgrading), knowing that the

graduate students might be registered for other WebCT courses influenced the decision to upgrade to the newer version of WebCT for the second iteration of the course.

Another new feature, the Dropbox Management Tool, allowed participating students to submit assignments easily, such as the answers to reference questions. In the first iteration of the course, students had e-mailed their assignments as attachments. Using the Dropbox Management Tool, students opened the file with the set of questions, printed out the assignment, located the answers, and created a file with the answers. They submitted the answers to the instructor via the Dropbox (see Figure 3). WebCT instructors can open the submission files to reveal a list of the students and the assignments they have submitted. After grading the assignment, an instructor assigns a grade (or points earned) and submits the grade. There is also the capability of adding comments. The grade is automatically recorded in the grade management tool. Students can access only their own grades and comments (see Figure 4), not the grades of the other students. Participants were notified on their My WebCT page when grades had been posted. For submissions to the Dropbox, participants could track their progress as well as access instructors' comments (see Figure 7).

Another enhancement, the student presentation area, allowed students to create one page that linked to all their projects (see Figure 5 for an example). Using the presentation area allowed students to share their instructional

Assignment Dropbox Management			
Current date: Jul 02, 2000 16:10			
Title	Availability	Grade	Results
Ø Reference Set II	From: Feb 15, 2000 21:00 To: Feb 29, 2000 17:00	/ 24	(Submissions)
Ø GALILEO: Set 3	From: Feb 29, 2000 21:00 To: Mar 14, 2000 19:00	/ 24	(Submissions)
Ø GALILEO: Set 4	From: Mar 14, 2000 21:00 To: Mar 28, 2000 20:00	/ 24	(Submissions)
Ø GALILEO: Set 5	From: Apr 2, 2000 22:00 To: Apr 25, 2000 17:00	/ 24	(Submissions)

Figure 3. Assignment dropbox management tool for ELMT8370 (spring 2000).

Citation Guide	Virtual Pathfinder	Student Web Pages	Bibliographic Institution	Reference (Set1)	Reference (Set 11)	GALILEO (set111)	GALILEO (Set IV)	GALILEO (Set V)
					Submissions	Submissions	Submissions	Submissions
30	90	90	95	24	24	215	20	21

Figure 4. Example of the grade management tool in WebCT: ELMT 8370 (spring 2000).

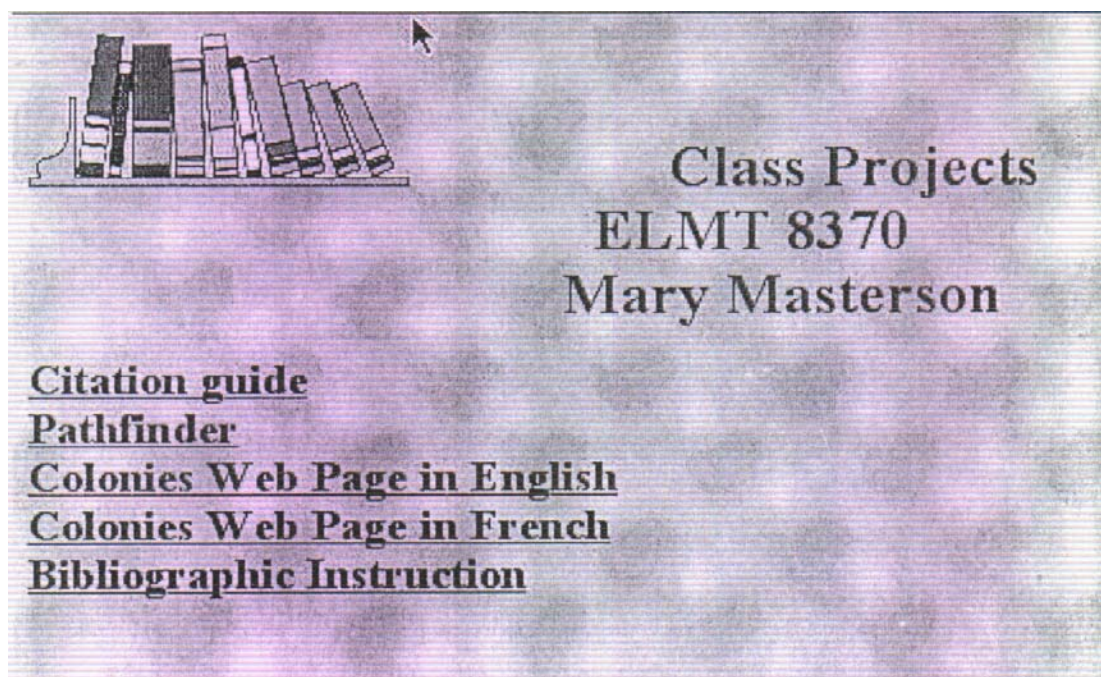


Figure 5. Page with hyperlinks to projects: ELMT8370 (spring 2000).

projects with other members of the class. This feature, although the most valuable of the improvements, caused the most difficulty for the students. Students had to create an html document (index.html) that provided links to their projects. Most of the technical problems centered on this task. The reward was that class members could view or download the projects of other students in the class, thereby creating a virtual community of learners who were able to share not only their ideas and thoughts, but their actual projects.

Another feature allowed the provision of a database of course participants' photos and current places of employment. This was added to the second iteration of the course to help students become acquainted with others in the Web-based course. A link to the image database from the course home page was created. The link was called "All About Us." In the first iteration of the course, students had missed face-to-face interaction.

Reference Questions and Assigned Projects

Assignments were geared to the information literacy competencies. The reference questions helped students become familiar with Internet search engines and the various GALILEO databases. The projects gave the participants an opportunity to develop technological skills in the areas of citing electronic sources, developing Web pages, creating bibliographic instruction, and creating virtual pathfinders for particular curricular areas. The reference

assignments were submitted to the Dropbox, and all other projects were published in the student presentation area. Students were notified when grades and been posted and could track their progress and access instructors' comments.

Information Retrieval Activities

Students were assigned five sets of reference questions. Instructions for the first set limited the search to Internet resources other than the GALILEO databases. The remaining sets limited the searches to only the GALILEO databases. Questions were written to address a certain search strategy, such as using advanced searches or Boolean searching operators.

Projects to Develop Additional Information Literacy Skills

A range of projects were included in the course to develop additional information literacy skills: a citation guide, a virtual pathfinder, bibliographic instruction, and a student Web page. The citation guide assignment required

Refset4.DOC	Mar 28, 2000 8:55	38 kB
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Grade: out of 24

Comments:

q-1 Census data is included in the category Government Publications. Census data is also included in the alphabetical list of databases in GALILEO.

Your answers were thorough, well-documented and easy to follow. You have excellent search skills and know when to use what databases.

11-12 were good examples of. questions that can be asked (and are asked in school settings). Nice audit trail provided .for

Figure 7. Dialog box for instructor comments: ELMT 8370 (spring 2000).

Question: Your friend in Texas is an elementary school media specialist. She was telling you that recently a parent has challenged a picture book about AIDS called: *Tiger* (something). You are not familiar with the book. Can you find any reviews that will tell you something about it? ¶

¶

Answer: Four reviews can be located online: ¶

--*Tiger* flowers (book review). I Quinlan, Patricia. I Constantinides, Judy, reviewer. I School Library Journal I.v. 40 (July'94) p. 87 ¶

--*Tiger* flowers (book-review). I Quinlan, Patricia. I McNaughton, Janet, reviewer. I Quill & Quire. I.v. 60 (Apr.'94.) p. 36 ¶

--*Tiger* flowers (book review).I Quinlan, Patricia. I Sutton, Roger, reviewer. I Bulletin of the Center for Children's Books I. v. 47 (July/Aug. '94) p. 371 ¶

--*Tiger* flowers (book review). I Quinlan, Patricia. I Del Negro, Janice, reviewer. I Booklist I.v. 90 (June 1-15'94) p. 1843 ¶

¶

Database: GALILEO database. Book Review Digest ¶

¶

Strategy Objective: Using "AIDS" and "Tiger" as subject key words in a Advanced search results in 4 citations, 2 of these are book reviews. However using the title (*Tiger* flowers) in another (title) search turns up 2 additional reviews, for a total of 4.¶

Figure 8. Sample question from ELMT 8370 (spring 2000).

participating students to develop a style guide for citing online sources for the students and teachers in their respective schools. The guide was to be based on the style predominantly used in their school or system, for example, APA or MLA.

The virtual pathfinder assignment required the students to create a virtual library guide or pathfinder for their school. Participants were asked to analyze recurring topics in their school's curriculum and to develop a Web page with hyperlinks to online information. The pathfinder was to include suggested search strategies for the students and to encompass all online resources available to their school's students including the school's online catalog, subscription services, and the GALILEO databases available in their school system.

Another project, bibliographic instruction for K-12 students, concerned how to help K-12 students develop effective online search strategies. Using Internet resources (including GALILEO), as well as the CD-ROM resources and online subscriptions available in their schools, the students were asked to develop bibliographic instruction in a format that could be posted in the student presentation area of WebCT. For example, they could create an activity such as a scavenger hunt to assess students' searching skills. Participants were required to prepare digital handouts so that their classmates

could also use the instructional aids. Another option was to prepare their instruction in a PowerPoint presentation and upload this file to the student presentation area. Four of the 11 participants chose to develop and upload PowerPoint presentations. The sharing of created resources helped to create a community of learners in the class.

For the student Web page project, the graduate students were asked to collaborate with a teacher (and perhaps the local school technology coordinator) to plan a research project and to support student endeavors to create their final research product in the form of a Web page. The Instructional Technology Center in the College of Education had recently been designated as a sister library to a library in Toulouse, France. Part of the partnership involved creating a Web site where K-12 students could publish and share their research projects as Web pages, which were posted in French and in English. If participants wished to participate in the Atlanta-Toulouse Sister Library Partnership, they could translate the student-created research project Web pages into French by using the computer-translator program available through Alta Vista. Several participants asked French teachers or advanced French-language students to help with the translations. Several of these pages were posted on the Atlanta-Toulouse Sister Library Page.

Technical Considerations

Students met on campus for the first two sessions. The mechanics of WebCT and the creation of Web pages were covered during these sessions. An additional lab opportunity was provided in mid-semester for those students requiring additional instruction and practice. Uploading files to the file manager and linking these files to the project page required students to develop procedural skills. File formats uploaded to the student presentation area included Web pages, PowerPoint presentations, Word documents, and graphics. Creating the linking page in html was difficult for most of the students in the class, and this issue will be addressed in the beginning sessions of subsequent WebCT courses. The instructor has developed a detailed "job aid" to use with future classes. Although students viewed the sharing of projects in the student presentation area as extremely beneficial, the task of linking projects to one page caused them great difficulty.

Instructional Design Issues

WebCT is a tool that facilitates the creation of Web-based learning environments. The first page of a WebCT course is the course home page. The home page can be configured as needed (see Figure 9). WebCT tool pages can be created and linked from the course home page. The instructor or designer can choose what tools to use and how to organize the paths to information.

The theory of education by engagement and construction (Shneiderman, 1994) holds that students are not strongly motivated by the goals of acquiring facts, accessing information, drill and practice, and listening to lectures, but that they prefer to create, communicate, plan, explore, build, discover, par-

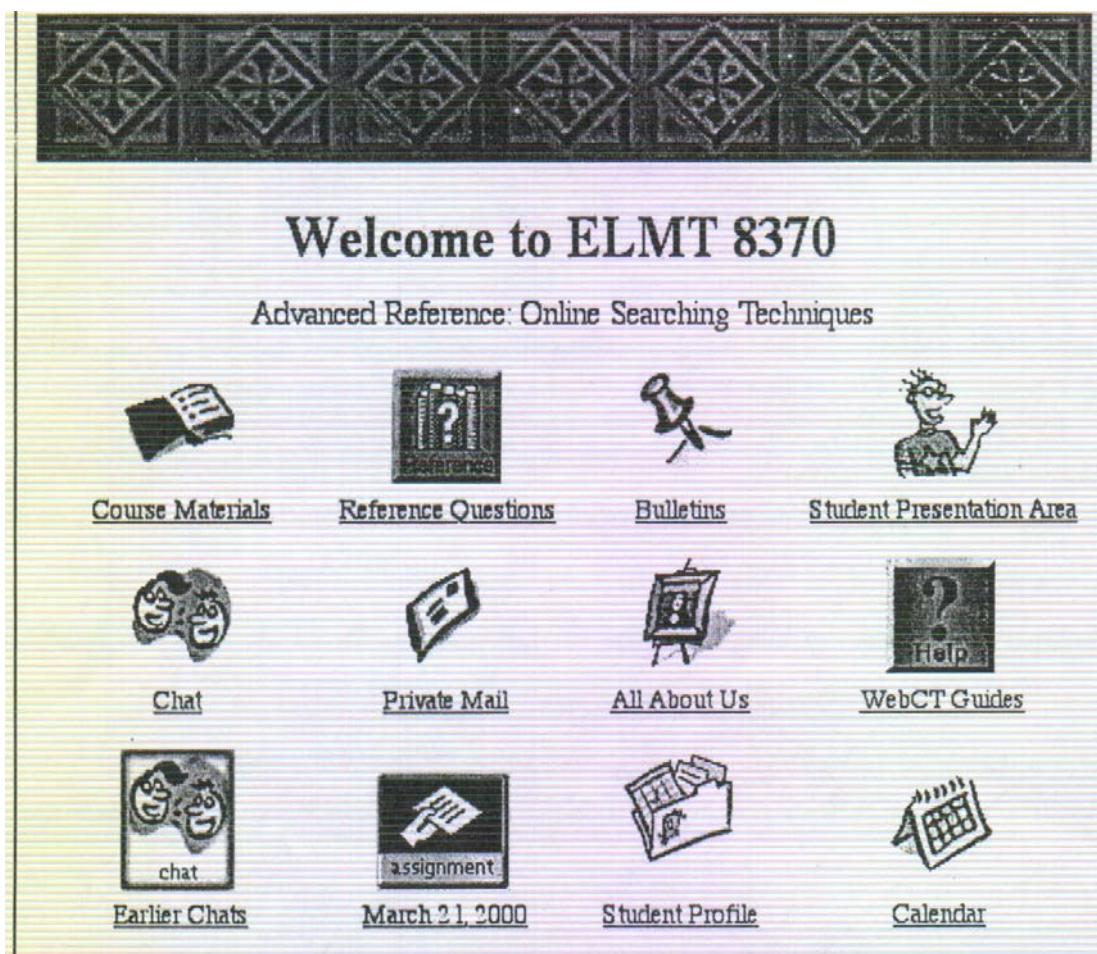


Figure 9. Course home page for ELMT 8370 (spring 2000).

icipate, initiate, and collaborate. Shneiderman speculates that computer technologies have so empowered students that they can create remarkable objects of great value to others. His set of distance learning guidelines helped guide the development of the assigned projects: (a) facilitate ease of access to needed technologies, (b) promote a sense of engagement, (c) foster sharing of information, (d) promote individual gratification. These guidelines, along with the four components for effective instruction: (a) information presentation, (b) learner guidance, (c) practice with feedback, and (d) learning assessment (Alessi & Trollip, 1991), helped clarify and define the course organization and activities. Web-based instruction supports any or all of the elements of effective instruction.

- *Information presentation.* The course Advanced Reference: Online Searching Techniques was developed as an information "container" with course tools, assignments, and hyperlinks to external Web sites. Information was presented primarily using WWW pages.
- *Learner guidance.* The chat room provided a means of synchronously communicating with students to discuss course content and exercises. In the revised course, students submitted the answers to reference questions by using the Dropbox feature available in version 2 of

WebCT. Private mail provided an audit trail and permitted a means of quick response to student questions.

- *Practice with feedback.* Five sets of reference questions were posted from the main page of the course. Practice in searching helped refine students' search strategies. Feedback was provided during chat, and points earned and comments were posted in the student grade area.
- *Learning assessment.* Students' projects were shared in the student presentation area. Collaborative tools such as e-mail, live chat, and a shared space for student presentations were used for learner guidance, dialogue, and practice activities.

In summary, the course provided an opportunity for students to develop and practice the following technology-based skills in an Internet environment. The list represents an array of proficiencies, competencies, and abilities that enable one to be information literate: computer skills, communication skills (including electronic mail skills), online information retrieval skills, Web editing skills, and evaluation and synthesis skills.

Final Thoughts From the Instructor and Designer

One of the graduate students enrolled in this Web-based course worked in a media center where 30 networked computers with Internet access had just been installed. Her comment that now she knew "what to do" with those 30 computers made all the difficult work of mastering the technical aspects of a Web-based course worthwhile. It is not easy to teach from a distance. As the instructor, I sent over 650 e-mail messages; 80% of the messages dealt with technical questions and issues. To meet the educational needs of Preservice and practicing media specialists is the mission for school library faculty. Entry-level and advanced degree programs must include opportunities for developing technology and information retrieval skills. Web-based instruction offers a delivery system that supports education by engagement and construction and provides an arena for the development of information literacy competencies. Web-based instruction can foster information literacy and prepare media specialists to work in today's highly technical, technology-rich, school settings.

References

- Alessi, Stephen, & Trollip, Stanley. (1991). *Computer-based instruction: Methods and development*. Englewood Cliffs, NJ: Prentice Hall.
- American Library Association. (2000). President Long appoints core competencies task force. *American Libraries*, 31(1), 8.
- California Library Association. (1996). *CLA Task force on the future of librarianship* [Online]. Available: <http://www.cla-net.org/pubs/future.html> [2000, June 29].
- Hindes, M.A. (1999). Web-based instruction for school library media specialists: Unleash the instructional power of the Internet. In L. Lighthall & E. Howe (Eds.), *Proceedings of the third international forum on research in school librarianship* (pp. 207-215). Seattle, WA: American Association of School Librarians.
- Hopkins, Dianne McAfee. (1999). *Issues in the education of school library media specialists* [Online]. Available: <http://www.ala.org/congress/hopkins.html> [1999, June 24].

- Khan, B.H. (1999). *Web-based training*. Englewood Cliffs, NJ: Educational Technology Publications.
- Merriam, Sharan. (1988). *Case study research in education*. San Francisco, CA: Jossey-Bass.
- Patton, Michael Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage.
- Shneiderman, Ben. (1994). *Education by engagement and construction: Can distance learning be better than face-to-face?* [Online]. Available: <http://www.hitl.washington.edu/scivw/EVE/distance.html> [2000, June 30].

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