

Crossing to Web-based Instruction: The Importance of Instructional Assessment

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Introduction

Academic librarians have for some time used computer-assisted instruction for teaching basic information literacy skills at the undergraduate level.¹ Now, experimentation with Web-based instruction is becoming increasingly popular.² The importance of evaluating the success of information literacy instruction, regardless of the delivery method, is of great value to academic instruction librarians.³ One of the challenges of maintaining this value is how to continue evaluating information literacy instruction that uses Web-based tutorials. This paper examines the effectiveness of a Web-based information literacy tutorial in a computer literacy course at Eastern Washington University (EWU).

Computer Literacy and Library Instruction

At EWU, all students are required to complete a computer literacy course by the end of their sophomore year. Students can, however, test out of the course requirement if they choose. Approximately 350 students per quarter enroll in the course. The goal of the computer literacy course is to provide students with a basic understanding of com-

puters, ranging from hardware components and software programs, as well as competency in creating and querying databases and Web page design.

Since 1996, a library instruction component has been incorporated into the course. The goal of the library component is to empower students with the skills to navigate through the variety of databases available on the library system. In doing so, the objectives are for the students to gain a richer understanding of bibliographic databases, in particular: choosing the most appropriate database for an information need, searching the database most effectively, and interpreting bibliographic information. Evaluation criteria are emphasized to help students assess the relevancy and reliability of information from various databases and the World Wide Web.

With the library objectives in mind, students were taught how to distinguish among the types of materials presented in each database and were shown how to create more efficient and effective search strategies. Initially, a librarian delivered a 50-minute lecture to students in large lecture halls. Each lecture had 60 to 100 students in attendance.

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The lecture demonstrated the use of the online catalog and periodical databases to locate materials as well as an introduction to Internet resources. Criteria used to evaluate web sites were also emphasized. Teaching students how to access these databases remotely was also demonstrated since the majority of students were using library resources from outside the campus library.

Since the students were not required to write a research paper in the computer literacy course, the content of the library component had to have a general appeal to the students. Instruction in the use of online systems had to reinforce the concept that understanding how to use information retrieval systems efficiently is important as a lifelong learning goal, not just to complete a class assignment. Therefore, a popular regional issue was used as an example throughout the database demonstration.

After the lecture each student was required to complete a library exercise. The exercise was included to reinforce the concepts taught in the lecture and to provide the students with hands-on experience. The exercise could be completed by the students at home or during their scheduled lab periods and covered the use of the online catalog, searching periodical databases, and evaluating Internet sites. It was submitted to and graded by their teaching assistant. Library-specific questions were also incorporated into the comprehensive computer literacy final exam.

Course Reorganization

The computer literacy course was reorganized to establish smaller class sizes (30–35 students per class), which resulted in a significant increase in the instruction sessions needed to teach the library component to the students. At the time of the reorganization, there were only two librarians

providing instruction. After the restructuring of the computer literacy course, multiple library lectures would be required over a very short period (4–5 days). Given the workloads of the librarians and the timing of the sessions, a reevaluation of how best to present the information was undertaken.

The instruction coordinator had already been considering ways to effectively incorporate online instruction into the library instruction curriculum. The change in the computer literacy course created a perfect opportunity to implement online tutorials. Fortunately, the University had just acquired Blackboard's CourseInfo, a Web-based product for delivering online instruction, and was soliciting faculty to participate in a pilot test of the software. Starting in fall 1999, CourseInfo was used to replace the traditional 50-minute library instruction session and was used by the students to complete 5 online library exercises. The challenge in this process was not only in developing an online component using CourseInfo, but also in assessing its effectiveness.

By using CourseInfo to deliver library instruction, the librarians did not have to provide multiple lectures in an unrealistic time frame. The same lecture content was delivered online and the exercises could now be completed online rather than on paper. Figure 1 shows the CourseInfo opening page for the library component of computer literacy. All of the course-related materials were assessable from the navigational buttons on the left.

The exercises, which were within the *Assignments* category, were divided into 5 components so that the students could complete each exercise in one sitting. Each exercise ranged from 3–8 questions, and covered search strategies using the online catalog, choosing an appropriate periodi-

Figure 1. Opening Page of CourseInfo

Computer Literacy

Announcements
Posted in the Last Two Weeks

Subject: An Announcement from your Instructor Posted by on Jul 28, 2000

**Welcome to the Library Component
of Computer Literacy 101**

- First, read the **Course Information** for instructions.
- If you want, read about the librarian who created the library component in **Staff Information**.
- Proceed to **Course Documents** to view the lecture.
- Test your knowledge by completing the required library lab exercises in **Assignments**.
- Check you grade in **Student Tools** and print it out for your instructor.

Figure 2. Sample Exercise Question with Feedback

Question 3 (Received 0 out of 1 point)

Question: The following Web sites contain valid information from reputable sources:

- 1) CDC HIV/AIDS at <http://www.cdc.gov/od/owh/whiv.htm>
- 2) Women as Percent of AIDS Cases at <http://www.tstradio.com/amaro2.html>
- 3) CDC-NCHSTP Divisions of HIV/AIDS Prevention at http://www.cdc.gov/nchstp/hiv_aids/stats/cumulati.htm

If you had to locate the current statistics on the number of women who have contracted AIDS, which of these web sites would you use? (Briefly peruse each of the sites)

Your answer: Women as Percent of AIDS

Correct answer: CDC-NCHSTP Divisions of HIV/AIDS Prevention

Feedback: The CDC-NCHSTP Divisions of HIV/AIDS Prevention had the most current statistics compared to the other two sites. In retrieving current data, look not only at the date that the web site was revised or created, but read the information within a document. It is also a good idea to examine more than one credible web site when looking for statistics on the Web.

cal database for a topic, searching two periodical databases on a topic, and analyzing web sites. The majority of the questions were multiple-choice with a few fill-in-the-blank questions. Students were required to open two browser windows while working on the exercises. One browser was open to the CourseInfo exercise questions and the other browser enabled them to search the various databases in order to answer the questions. Once the students submitted their answers, they could check their grades and receive immediate feedback on the correctness of their answer. Figure 2 is an example of the type of online feedback students received once they submitted their answer.

The online tutorial gave students the opportunity to review the material as often as needed and provided the teaching assistants flexibility in the scheduling of the tutorial during the quarter. Given the sheer number of students enrolled in the computer literacy course and the fact that requests for other departmental instructional sessions were growing, it was hoped that a change to online delivery would be equally as effective and more efficient.

Application of CourseInfo

Beginning in fall 1999, the instruction coordinator met with the teaching assistants to review CourseInfo functions and logon procedures, as well as the content of the online tutorial. Since the computer literacy course had lecture and lab periods, it was decided to introduce the tutorial during a lab period so that students could follow along with the logon instructions and begin the tutorial while their teaching assistant was present. If students were having difficulty, their

teaching assistant could intervene and answer questions. After the teaching assistants had time to review CourseInfo, they felt comfortable enough to introduce it to their students without the assistance of a librarian. They instructed their students to access CourseInfo from the University server.

There were over 350 students enrolled in the course with varying levels of computer literacy skills, and it was unclear how well this variety of students would take to CourseInfo. At the end of fall quarter, the instruction coordinator sent out a questionnaire soliciting feedback from the teaching assistants on the implementation of the new online component. In general, the comments were not that positive:

“Every student I spoke with personally shared that they would rather have had a real person teach the course as opposed to trying to glean all the necessary information off the *Course Documents*.”

“I feel they enjoyed the online course, just not the course content.”

“Students were frustrated when getting marked incorrect for a ‘space’ in their answer for the fill-in-the-blank questions.”

According to the teaching assistants, the students had multiple degrees of difficulty assessing and completing the tutorial and the exercises. Some of these problems were software related. However, some of the problems were due to the student’s unfamiliarity with CourseInfo, which was presented to them in just one lab period. The inability of the students to adjust to CourseInfo was unexpected. It was

anticipated that the students would become more at ease using new software programs, especially since CourseInfo was introduced near the end of the quarter, after they had gained some computer expertise. In discussions with the teaching assistants, it appeared that some teaching assistants did not adequately explain CourseInfo, nor did they explain the purpose of the library component as a part of the computer literacy curriculum. As a result, some confusion and resentment about the online tutorial occurred.

Based on this information, changes to the online component were made in preparation for winter quarter 2000. First, the content of the tutorial was refined and extraneous information was removed. The text was divided into shorter pages and more "white" space was provided to allow for easier reading of the text. Second, the exercise questions were reevaluated and as a result, a few ambiguous questions were deleted. In addition, the format of the exercises was changed to include only multiple-choice questions, eliminating fill-in-the-blank questions that previously resulted in software grading errors. Third, it was decided that a librarian would provide the introduction to CourseInfo. This way the purpose of the library curriculum would be explained correctly and students could be walked through the logon procedures until everyone successfully enrolled and logged on. Lastly, a more thorough assessment would be conducted during winter quarter to retrieve focused information about the effectiveness of online delivery to this group of students.

Methods of Evaluation

A variety of evaluation methods in winter quarter 2000 were employed to assess the effectiveness of CourseInfo. Students were observed while using CourseInfo, comments from students were solicited through an online survey, and a quasi-experiment comparing student test scores was conducted.

Observation of Students

Students appeared to have few technical problems using CourseInfo because of the thorough introduction provided to the students by a librarian on how to access CourseInfo and on the organization of the online library component. The students navigated through the course content (*Announcements*, *Course Information*, *Staff Information*, and *Course Documents*) with ease, and the majority of students were able to toggle between two browser windows, which was required when working on the *Assignments*. Most students were able to create a CourseInfo account and self enroll

without difficulty. Once a student created a CourseInfo account, the student was able to enroll in any CourseInfo course that was open to self-enrollment. At EWU, there were approximately twenty other classes that were using CourseInfo during the pilot project. Some students misunderstood the account registration process and created a new account each time they enrolled in a CourseInfo course, which resulted in multiple accounts for the same students.

Technical problems also occurred within the *Assignments* section for many students. These problems occurred not because of the student's inability to use the product but because of browser compatibility issues with the early version (3.0) of CourseInfo. Problems also arose because the *Assignments* section was set up to allow students only one attempt at completing the exercises. Students, who resized the window containing the exercise questions or hit the back button while working on an exercise, would initiate the page in the browser to automatically reload thereby losing their answers. When attempting to complete the exercise, CourseInfo would prevent these students from entering the exercise again. The students would receive an error message stating, "Sorry, you already took this assessment on [date]". On occasion, the exercises would time out for the slower students, and they too would reload the page, lose their answers, and be prevented from entering the exercise again. Likewise, those students who decided to go back to *Course Documents* to reread a portion of the lecture while working on an exercise were unable to get back into the exercise. The students who had these technical problems displayed noticeable frustration. In these cases, students' attempts needed to be cleared by the librarian so that they could complete all of the exercises.

Most of these technical problems encountered have been corrected in updated versions of CourseInfo (3.11+). Blackboard has improved their session management so that the browser navigational controls no longer break the session as they did in previous versions. In addition, CourseInfo instructors can select the option "Allow Multiple Attempts" when creating assessments so that students who inadvertently get "dumped" out of the *Assignments* can return and complete the exercises in full.

Observations also uncovered that students read the three-part lecture in *Course Documents* very quickly. To what extent a deep comprehension of the material occurred is questionable because of the speed in which the students went through the *Course Documents*. Some students continuously clicked through the Web pages and did not appear to be absorbing the information at all. It was also observed that

students rarely clicked on the hypertext links within the text of the *Course Documents*. Finally, it was observed that students wanted to work together when completing the exercises. They wanted to talk out the questions together and get feedback from their fellow students on why they had gotten a question wrong. Those who talked with the person to the right or left of them genuinely appeared to be having more fun. Perhaps, cooperative learning can take place using CourseInfo in a classroom environment.

Student Surveys

As a quasi-experiment, 283 students in the computer literacy course were randomly assigned to one of two groups. (Students in the honor classes and remedial class were not included.) One group of students received a “traditional” 50-minute library lecture by a librarian in their classes. The other group received the same information in the lecture online through *Course Documents*. Both groups completed the *Assignments* section online and were invited to complete a confidential online survey, which was to be filled out after the students had completed the assignments. Of the original 283 students, 175 completed the survey.

The online survey, which was created using Perseus Survey Solutions, collected information on students’ previous exposure to library instruction and resources, along with their opinions of the instruction (content, presentation, and applicability), the online exercises, and their opinions on different learning environments. In terms of the students’ previous experiences, 55.4% of the sample indicated that they had previously received library instruction at EWU. In terms of level of experience with the Internet, 15.4% identified themselves as “beginner,” 61.7% as “intermediate,” 21.1% as “advanced,” and 1.7% (3 students) as “professional.”

Table 1 depicts the percentage of students who felt the material presented was new to them. The high percentage

	% Yes	% No
Online Catalog (Griffin) at EWU	29.7	70.3
Periodical Indexes, such as FirstSearch & ProQuest	41.6	58.4
Subject Heading Fields in Databases	52.3	47.7
Evaluating Web Sites	46.8	53.2

of students who indicated that the material was not new to them may be due to the percentage of students (55.4%) who indicated that they had already received library instruction before at EWU.

Although the material was not new to many of the students, Table 2 indicates that the majority of the students felt that the instruction in all four categories was helpful. Only a small percentage of students, ranging from 7.5% to 12.8%, viewed the instruction in these areas as unhelpful.

Similarly, Table 3 shows that students’ opinions on the content, presentation, and applicability of the instruction were positive. Despite the technical problems in the *Assignments* section when completing the online exercises, 57% of the survey respondents liked completing the assignments online. Only 13% disliked completing the assignments online.

Interestingly, 27% of the survey respondents indicated that they would prefer all library instruction to be given online. While the largest percentage of students (43%) was neutral on this issue, 30% of the students indicated that they would *not* want to receive all library instruction online. As improvements in online course software continue to increase and as more and more “digital age” students enter the University, it will be interesting to see if the percentage of students preferring online instruction increases.

Through bivariate analysis, a comparison of student perceptions on the content, presentation, and applicability of the library component was made to determine if there were any significant differences between the survey re-

	% Extremely Helpful –Mostly Helpful	% Somewhat Helpful	% Mostly Not Helpful –Extremely Not Helpful
Online Catalog	46.5	40.7	12.8
Periodical Indexes	51.2	38.2	10.6
Subject Heading Fields	53.5	39.0	7.5
Evaluating Web Sites	48.0	40.9	11.1

Table 3
Student Perception of Content, Presentation and Applicability of Library Component

Survey Questions	% Too Little	% Just Right	% Too Much	
Amount of information	7.5	81.0	11.5	
		% Strongly Agree -Agree	Neutral	% Disagree -Strongly Disagree
Information presented was clear and well organized		67.4	21.5	11.1
Good use was made of examples and illustrations		65.1	25.1	9.8
Online exercises (assignments) helped reinforce concepts		69.5	25.3	5.2
Liked completing assignments online		56.1	30.6	13.3
I can apply the information I learned in my studies		69.8	22.7	7.5
Skills I gained will help me retrieve information in future		63.8	25.1	11.1
Would prefer all library instruction given online		27.5	42.7	29.8

sponses from the group who received the “traditional” 50-minute lecture in class and the group of students who read the lecture online. Findings indicate little difference between the survey responses of the two groups. However, out of 17 survey questions, there was a slight tendency for those students who received the “traditional” 50-minute lecture in-class to more likely agree that the online exercises helped reinforce the concepts [Chi-square = 10.485, df=4 Sig. .033] and that the information presented was clear and well organized [Chi-square = 13.262, df=4, Sig. .010].

To create the online lecture, a pre-existing oral lecture was converted into a Web document, which may be why the presentation of information was perceived to be clearer and well organized by the group of students receiving the lecture as it was originally intended. In the process of creating Web tutorials and online courses, the impulse to use pre-existing material may not always be the most suitable.

Finally, the survey also asked questions about different learning environments and students’ comfort levels in these

environments. Table 4 shows that the majority of the students felt comfortable learning in a variety of environments, and that no single learning environment was ranked higher than another. 78% of the survey respondents felt comfortable with self-paced, individual learning. This level of comfort is especially important for learning in online environments such as those created with CourseInfo.

Quasi-Experiment Comparing Student Scores

As previously described, the students (N=283) were randomly assigned to one of two groups. One group of students received the “traditional” 50-minute library lecture in their classes. The other group received the same information online through the *Course Documents*, with both groups completing the five library exercises online. The five exercises, totaling 35 points, consisted of the Online Library Catalog (10 points), Introduction to FirstSearch (4 points), Searching with FirstSearch (9 points), Searching with ProQuest Direct (6 points), and Evaluating Internet Resources (6 points).

Table 4
Student Comfort Levels in Different Learning Environments

	% Very Comfortable -Comfortable	% Neutral	% Uncomfortable- Very Uncomfortable
Classroom lecture with handouts	83.2	13.9	2.9
Classroom lecture with online demonstrations	77.7	17.0	5.3
Classroom lecture, online demonstrations, and hands-on	80.2	16.3	3.5
Small group work in the classroom	70.3	21.5	8.2
Self-paced, individual learning	78.0	16.3	5.7

T-tests were run to determine whether there was any significance in the differences in the means of the scores from the library exercises. Little difference in the performance between the two groups was discovered. There were two statistically significant findings; however, the actual means of the two student groups were not that different from each other.

- Online lecture students did statistically better on "Evaluating Web Resources" [In-class Lecture Mean = 4.96, Online Lecture Mean = 5.05] [.045 sig. level]; and
- In-class lecture students scored statistically better on all 5 exercises combined [In-class Lecture Mean = 29.75, Online Lecture Mean = 28.47] [.041 sig. level]

Both groups also answered library questions (20 points out of 100) on the final exam for the computer literacy course. T-tests were run to determine whether there was any significance in the differences in the means of the scores from the two groups on these final exam library questions. Similar to the t-test results with the library exercises, there was little difference in the performance between the two groups when comparing mean scores of their total points on the library questions from the final exam. The mean score for the "online lecture" students was 15.03 and the mean score for the "in-class" lecture students was 15.27. This difference is not statistically significant.

Concluding Remarks

Assessing the effectiveness of a library instruction course is even more crucial in an online learning environment where immediate feedback (student eye contact, body language, in-class questions and discussions, etc.) is not readily accessible to the librarian. A multi-method approach to evaluation (instructor comments, observation, student post-survey, and a quasi-experiment) was used for assessing library instruction via CourseInfo, because the authors believed that a combination of techniques would give the best overall picture of the effectiveness of instruction. The results from the quasi-experiment suggest that the extent to which students can learn the material is not dependent on whether the material is presented online or through a more traditional face-to-face lecture. Drawing too large of a conclusion based on these quasi-experimental findings, however, would be inappropriate in this case since a control group

was not used. Nevertheless, the quasi-experimental findings do complement the overall positive findings from observing the students and from the results of the student surveys. An issue that does need further testing is to what extent does an online learning environment meet the needs of a variety of student learning styles.

In terms of the applicability of CourseInfo for library instruction, the biggest advantage of BlackBoard's CourseInfo is that creating a class is as easy as typing text in a box. CourseInfo's "wizard-type" interface eliminates the need for library instructors to know anything about Web markup or programming languages. However, for those library instructors who wish to provide more online interactivity when presenting information to the students, the simplicity of CourseInfo can be limiting. In these situations, the use of other products such as Macromedia Flash or Dreamweaver, while keeping in mind usability issues, would be more appropriate. The quiriness of CourseInfo, which related to some of the technical problems exhibited during the *Assignments* section of the online library component, was especially problematic because of the sheer number of students in the computer literacy course. In general, then, the authors suggest using CourseInfo with a smaller number of students. Further studies need to be implemented to adequately determine if CourseInfo can be used to replace traditional face-to-face library instruction or if its application as a supplemental tool would be a much better utilization of the product.

Notes

1. L. Dixon, M. Garrett, R. Smith and A. Wallace, "Building Library Skills: Computer-Assisted Instruction for Undergraduates," *Research Strategies* 13 (1995): 196-208; J. M. Pask, "Computer-Assisted Instruction for Basic Library Skills," *Library Software Review* 7 (1988): 6-11.
2. N. H. Dewald, "Transporting Good Library Instruction Practices into the Web Environment: An Analysis of Online Tutorials," *The Journal of Academic Librarianship* 25 (1999): 26-31.
3. R. Fenske, "Computer Literacy and the Library: A New Connection," *Reference Services Review* 26 (1998): 67-72, 78; R. Fenske and A. Roselle, "Proving the Efficacy of Library Instruction Evaluation," *Research Strategies* 16 (1999): 175-85; P. Ragains, "Evaluation of Academic Librarians' Instructional Performance: Report of a National Survey," *Research Strategies* 15 (1997): 159-75; A. Roselle, "Using the ALA's 'Evaluating Library Instruction'," *The Journal of Academic Librarianship* 23 (1997): 390-7.