The Effectiveness of Multimedia for Library-User Education: Final Report of the LUMENS Project

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job responsibilities, they completed the wide range of activities—learning how to do multimedia production, generating the idea for a multimedia show, identifying the appropriate audience for their shows, storyboarding their shows, doing development work or advising project staff on development work, conducting usability testing, and revising their show based on usability results—that was necessary to build and deploy a working multimedia show. Additionally, they evaluated their multimedia show, receiving approval for their evaluation plans from their university's institutional review boards, recruiting subjects, and administering pre- and post-tests to or conducting personal interviews with library users.

Several library educators, Neal Baker, Christine Larson, and Sara Penhale at Earlham College, Jane Kinkus, Alexis Macklin, and Song Yu at Purdue University, and Marty Brennan at the University of Illinois Chicago, are commended for their efforts to learn multimedia production during the project's first year. Although they were compelled to terminate their participation in the project prior to its completion, this report's principal author acknowledges their diligence and support throughout the project.

The Michigan project team provided the principal author with invaluable assistance throughout the project. Project Manager Sarah J. Tyrchniewicz (formerly Wacksmuth) assisted the PI during the project's initial planning and training phases. Sarah and Student Research Assistants Sung Jun Park and Ronald P. Chae were always on hand to answer library educators' questions about Flash authoring and solve problems connected with distance-education programs and equipment. Michael Spaly completed development work on several multimedia shows and was the principal architect and designer of the "Journals to the Rescue" for Jane Kinkus at Purdue University. When the PI questioned library educators about achieving the project's fourth objective regarding the future of multimedia production for library-user education at their institutions, all cited Michael's outstanding development work, his attention to detail, his immediate responsiveness to their demands, and his ability to communicate effectively despite working thousands of miles away in Seattle, Washington. Kelly

1   Project Essentials

Dramatic changes in technology and society are having a considerable impact on libraries and their instructional programs. These changes have created an urgency to teach library users how to become more effective, efficient, and independent in their search for information. But it has become increasingly difficult for librarians to reach library users for the following reasons. Fewer users are coming to the library because they can now access many collections through their personal computers (Makulowich 2000; Bertot, McClure & Ryan 2001). Library educators have experienced many difficulties over the years reaching students through the teaching faculty (Farber 1974; Kirk 1974; Hardesty 1995; Tiefel 1995; Breivik 1998). And many students follow the path of least resistance—they return to the same tools whether or not they are appropriate and they ask their friends rather than librarians for help (Valentine 1993; Leckie 1996).

1.1   "Multimedia" and "Interactive Multimedia"

Interactive multimedia may be the solution to the problem of transitioning from face-to-face learning to learning in an online networked library environment. Although often referred to by writers and producers as if they are the same medium, *multimedia* and *interactive multimedia* are very different. *Multimedia* without interactivity is an illustrated book, a photograph with a caption, a movie, television program, or listening to a friend describe a snapshot without asking questions. *Interactive multimedia* uses words in text and voiceover, sound effects, music, live-action, still, and animated images, and an interface that lets the person be either a passive viewer or an inquisitive user (Lester 2000).

Since the inception of the World-Wide Web in the early 1990s, web developers have built multimedia sites that are comparable to illustrated books, that is, they

are just plain old *multimedia*—they contain lots of text, still graphics, miniature animated graphics that repeat the same tedious, insignificant action over and over again, and "back" and "forward" buttons that don't function much differently from turning the pages of a book. When these web sites actually feature multimedia such as banners, buttons, bitmap images, cartoons, or animations, users become discouraged and exit sites because they have to wait so long for multimedia content to load into their browsers.

1.2 Macromedia Flash for Interactive Multimedia Production

Since the late 1990s, Macromedia has released several versions of Flash—a production tool for web-based interactive multimedia sites. Flash has solved many of the problems connected with the design and development of *interactive multimedia* Web sites such as featuring vector graphics for efficient loading of images, object reuse, streaming content, and MP3 for audio compression. Interactive multimedia developers no longer have need to enlist a half-dozen multimedia creation and authoring tools to develop web sites. They can rely on Flash almost exclusively to create and assemble multimedia content and build an interface to enable web users to explore the web site. Library educators now have a powerful tool at their fingertips for teaching patrons about library systems, resources, and services.

1.3 Purpose Statement

The purpose of the LUMENS (The Effectiveness of Multimedia for Library-User Education) Project was to train library educators to build *interactive multimedia* Web sites using Macromedia Flash and to enlist library users in a test of these sites to determine whether *interactive multimedia* web sites are effective vehicles for conveying library-user education content. The research effort included a large-scale, distance-education training effort because few library educators are trained in interactive multimedia production.

1.4 Project Objectives

The LUMENS Project had the following four objectives:

- Instruct project participants in interactive multimedia production

- Using Macromedia Flash, author interactive multimedia Web sites that support participating libraries' goals for library-user education and information literacy

- Test authored sites to determine whether *interactive multimedia* Web sites are effective vehicles for conveying library-user education content

- Plan for workshops, demonstrations, and immersion programs at which library educators trained in interactive multimedia production can pass their knowledge and skills onto interested staff and colleagues

1.5 Project design

Table 1 enumerates the nine steps of the LUMENS Project. It includes the people responsible for the work effort and the original and actual dates of the work effort.

Table 1. Nine Design Steps of the LUMENS Project

Step	Responsibility	Original Date	Actual Date
1. Recruit libraries and library educators for participation in the proposed project	Principal Investigator (PI)	3 mos: 11/2000 to 1/2001	(Same)
2. Prepare for training in multimedia production using distance-education technologies	PI	3 mos.: 10/2001 to 12/2001	(Same)
3. Prepare distance-education technologies	PI and Project Manager (PM)	2 mos.: 12/2001 to 1/2002	(Same)
4. Deliver training in multimedia production using distance-education technologies	PI, PM, and library educators	5 mos.: 2/2002 to 6/2002	9 mos.: 2/2002 to 10/2002
5. Draft representations of library-user education projects	PI and library educators	2 mos.: 6/2002 to 7/2002	9 mos.: 4/2002 to 12/2002
6. Author library-user education projects using Flash for multimedia production	Library educators in consultation with project staff	5 mos.: 8/2002 to 12/2002	21 mos.: 7/2002 to 3/2004

7. Deploy library-user education projects on local web servers	Library educators	9 mos.: 1/2003 to 9/2003	9 mos.: 1/2004 to 9/2004
8. Evaluate library-user education projects	Library educators in consultation with project staff	9 mos: 1/2003 to 9/2003	8 mos.: 2/2004 to 9/2004
9. Engage in a dialogue to broaden the use of multimedia in library-user education	PI, PM, and library educators	3 months, 7/2003 to 9/2003	3 mos.: 7/2004 to 9/2004

1.6 Project Participants

In step 1, the principal investigator secured the participation of four institutions: (1) Earlham College, (2) University of Illinois-Chicago (UIC), (3) University of Notre Dame (UND), and (4) Purdue University (PU). When the project started in October 2001, seventeen library educators (four to five educators per institution) were on board. Their names, titles, and libraries are enumerated in Table 2.

When the project ended in September 2004, eight library educators were active participants on the project. Educators dropped out for different reasons: (1) taking new jobs at other institutions (Brennan, Koenig, and Yu), (2) heavy project workload and/or long-term nature of the project (Baker, Kinkus, Larson, Penhale, and Russell), and (3) disinterest (Macklin). In Table 2, the column named "Status" describes participants' status in the LUMENS Project at the end of the project.

Table 3 lists project staff, titles, and responsibilities. Project staff were especially active during the development phase of the project, assisting library educators with multimedia production tasks and answering questions and solving problems connected with multimedia software.

Table 2. Library Educators at Participating Institutions

Name	Title	Library	Status
Annie Armstrong	Assistant Reference Librarian	Richard J. Daley Library at University of Illinois, Chicago (UIC)	Active
Neal Baker	Information Technology Librarian	Lilly Library at Earlham	Inactive
Marty Brennan	Assistant Information Services Librarian	Library of the Health Sciences at UIC	Resigned
Sandy De Groote	Assistant Information Services Librarian	Library of the Health Sciences at UIC	Active
Michael Fosmire	Science Librarian	Purdue University Libraries	Active
Laura Fuderer	Subject Librarian for English and French Language and Literature	Hesburgh Library at UND	Active
Helen Georgas	Instruction Coordinator	Richard J. Daley Library at UIC	Active
Jane Kinkus	Math Science and General Science Librarian	Mathematical Sciences Library at PU	Resigned
Melissa Koenig	Assistant Reference Librarian	Richard J. Daley Library at UIC	Resigned
Christine Larson	Reference/Instruction Librarian and Librarian to the Seminaries	Lilly Library at Earlham	Inactive
Alexius Macklin	User Instruction Librarian	Purdue University Libraries	Inactive
Sara Penhale	Science Librarian	Science Library at Earlham	Inactive
Janet Russell	Science Education Coordinator	Howard Hughes Medical Institute at Earlham	Resigned
Linda Sharp	Reference Librarian	Hesburgh Library at UND	Active
Cheri Smith	Education and Psychology Reference Librarian	Hesburgh Library at UND	Active
Joni Warner (formerly Kanzler)	Coordinator of Library Instruction	Hesburgh Library at UND	Active
Song Yu	Chemical Information Specialist	Mellon Library of Chemistry at PU	Resigned

Table 3. Project Staff

Name	Title	Dates	Responsibilities
Karen Markey	Principal Investigator (PI)	October 2001 to September 2004	All facets of project management and operation especially training, design, evaluation, data analysis and report writing
Sarah Tyrchniewicz	Project Manager (PM)	January 2002 to April 2003	Answering questions, scheduling, general troubleshooting, multimedia production
Sung Jun Park	Student Research Assistant (SRA)	July 2002 to April 2003	Multimedia production, ActionScript programming, general troubleshooting
Ronald P. Chae	SRA	September 2002 to February 2003	Multimedia production, ActionScript programming, general troubleshooting
Michael Spaly	SRA	February 2003 to September 2004	Multimedia production, ActionScript programming, general troubleshooting
Kelly Garrett	Doctoral Student Research Assistant	June to September 2004	Data analysis; final report writing of the statistical analysis

2   Training in Multimedia Production

Section 2 describes the efforts of project staff and library educators to achieve this project's first objective:

- Instruct project participants in interactive multimedia production

2.1   Texts and Topics

The PI chose two texts to teach library educators how to develop multimedia projects using the Macromedia Flash authoring program: (1) *Foundation Flash 5* by S. Bhangal, A. Farr, and P. Rey, and (2) *Flash ActionScript f/x & Design* by B. Sanders. Two texts were needed because introductory texts such as *Foundation Flash 5* present ActionScript programming in a cursory manner. Adding the Sanders text was necessary because the text gave in-depth coverage to ActionScript programming and did not assume that learners had previous experience in computer programming.

The PI scheduled a list of topics for the 5-month training period (see Table 4). She then prepared learning materials that she would use to teach these topics such as PowerPoint slides, Flash authoring files, and Flash movie files. Since she would be using distance-education technologies to deliver the training, she expected that there would be some adjustment to the schedule because of the difficulty of determining how much content to put into a 75-minute weekly training broadcast. She also scheduled a 1-1/2 day face-to-face meeting in Ann Arbor for all project participants. An important objective of the meeting was to teach library educators the methodology for developing a multimedia show. This methodology requires developers to envision their project in terms of five on-paper representations. Using this methodology saves developers from making major mistakes during the development phase when it may be too late to

reformulate the project.

2.2 Prepare Distance-education Technologies

Project staff pretested the Webex computer conferencing software with library educators to make sure that everyone was able to connect and receive Webex broadcasts and developed familiarity with Webex functionality. Webex allows people to hold highly interactive Web meetings with real-time data, voice, and video communications through a standard Web browser.

Library educators connected to a brief Webex meeting four times in December 2001 and three times in January 2002. During these brief meetings, the PI, PM, and library educators tested the program's features for document sharing, desktop sharing, marking up whiteboards, asking questions, responding to ad hoc polls, and taking turns being the presenter. When weekly broadcasts of multimedia content began in late January, the PI, PM, and library educators felt confident using Webex.

In July 2002, the Alliance for Community Technology (ACT), the project's source for computer-conferencing software, informed the PI that ACT was consolidating distance-learning activities to a newer, more powerful, and capable program called Centra. Centra had several advantages over Webex for conducting LUMENS Project business including the recording of weekly broadcasts and elimination of long-distance phone calls for the audio component of weekly broadcasts.

Project participants cited the disadvantages of switching from Webex to Centra. For example, participants felt that it was too complicated to ask a question, make a comment, or respond with a quick "yes" or "no" to a question. Missing from Centra was the spontaneity that was present during Webex meetings when participants could respond to the leader's questions, blurt out a question, laugh about a situation, etc. When training ended in fall 2002, project staff and participants never used Centra again.

2.3 Training in Multimedia Production

Table 4 enumerates the topics of weekly Webex broadcasts. Weekly Webex broadcasts took place on Wednesdays from 10:15 to 11:30 am. When using Webex, library educators at the four participating libraries gathered in a conference room or computer laboratory, connected to Webex on a teacher's workstation that projected the computer monitor's image to a screen, launched Flash on their own PCs, and used Flash on their PCs to follow demonstrations. Since participants attended Webex broadcasts as a group, they could monitor their colleagues' progress and help each other when they got lost or did not understand something. The opportunity to interact with colleagues was missing during Centra broadcasts because participants sat alone in their separate offices, watched the instructor's demonstration on their web browsers, and listened to the broadcast using combined headphone-microphones.

Table 4. Topics for Weekly Multimedia Training Broadcasts

Date in 2002	Subject
Jan. 23	Logistics Introduction to integrated multimedia
Jan. 30	The Flash authoring environment
Feb. 6	Tools for creating a multimedia show's interface and content
Feb. 13	Symbols—Flash's feature for repeated reuse of the same object
Feb. 20	Helpful Flash features for managing on-stage content How to convert Flash (.fla) authoring files into movies that play on the web (.swf and .html)
Feb. 27	Rest and catch-up
Mar. 6	Enhancing the appearance of on-stage objects
Mar. 13	Enhancing the appearance of on-stage objects (Continued)
Mar. 20	(No Webex broadcast is scheduled due to overlap with meeting in Ann Arbor.)
Mar. 27	Animating Flash symbols
April 3	Shape tweening in Flash
April 10	Creating masks in Flash
April 17	Simple interactivity using ActionScript

April 24	Optimizing Flash movies
May 1	Sharing project ideas
	A review of the treatment, outline, and flowchart representations of Flash shows
May 22	Using ActionScript to control movie clips
June 19	A review of using ActionScript to control movie clips
July 3	An introduction to ActionScript variables
July 10	More on ActionScript variables
July 17	Controlling movie clips with ActionScript
July 24	An introduction to ActionScript conditional statements
July 31	More on conditional statements
Aug. 28	Ten usability heuristics (guest speaker: Professor Suresh Bhavnani)
Sept. 4	The importance of style in Flash movies
Sept. 6, 9, and 10	Obtaining Sound Forge
	Centra training session
Sept. 11	An introduction to digital sound
Sept. 18	Basic Sound Forge
Sept. 26	Intermediate Sound Forge
Oct. 9	How Flash handles sound 1
Oct. 16	How Flash handles sound 2
Oct. 23	Using ActionScript to control sound

2.4 Training in Ann Arbor

Not long after training in multimedia production began, all but one of the original seventeen library educators participating in the LUMENS Project traveled to Ann Arbor and took part in a two-day meeting (on March 19 and 20, 2002) to accomplish these three objectives:

1.	Become familiar with the methodology for planning multimedia productions

2.	Survey compelling features of related media that may be applied to educators' ideas for a multimedia program

3.	Apply outcome-based evaluation (OBE) to the evaluation of educators'

multimedia programs

At the meeting, project staff and participants met each other, shared common goals and interests, and built trust through face-to-face interaction. When some participants learned what others had in mind for their topics, they grew confident in their own ideas.

The PI presented a methodology for developing a multimedia shows that starts with text-based representations, i.e., idea statement, audience statement, and treatment, and culminates with visual representations, i.e., flowchart and storyboard. These representations give multimedia designers the chance to formalize their ideas on paper before embarking on time-consuming and labor intensive production work. Participants who left the meeting with ideas for their multimedia shows in mind were given the assignment of generating a treatment. Participants who were still in a quandary about their topics were given the assignment of choosing topics and submitting their ideas to the PI for review and comments.

Although it might have been premature to discuss the evaluation so early in the project, the PI took the opportunity of the two-day meeting to consider various options for the evaluation. To introduce library educators to outcome-based evaluation, she used learning materials developed by Alliance Group staff who conducted a two-day workshop on Outcome-Based Evaluation that the PI attended on October 31 and November 1, 2001.

3   Developing Multimedia Shows

Section 3 describes the efforts of project staff and library educators to achieve this project's second objective:

- Using Macromedia Flash, author interactive multimedia Web sites that support participating libraries' goals for library-user education and information literacy

3.1 Topic Selection

A few months after the two-day meeting, all participating library educators had submitted a topic statement to the PI that described multimedia shows. Table 5 lists educators' original topics along with their final ideas.

Table 5. Educators' Ideas for Multimedia Shows

Educators	School	Initial Idea	Final Idea
Neal Baker	Earlham	Doing Citation Searching	(Inactive)
Christine Larson	Earlham	Doing Citation Searching	(Inactive)
Sara Penhale	Earlham	Doing Citation Searching	(Inactive)
Annie Armstrong	UIC	Doing Research: An Introduction to the Concepts of Online Searching	(No change)
Marty Brennan	UIC	Where Can I Find This Journal?	(Resigned)
Sandy De Groote	UIC	Keeping Current in Your Field	(No change)
Helen Georgas	UIC	Doing Research: An Introduction to the Concepts of Online Searching	(No change)

Laura Fuderer	UND	Promoting the Early English Books Online Database	Hungry for Information? Evaluating Web Sites
Joni Warner	UND	How to Decipher a Bibliographic Citation	Hungry for Information? Evaluating Web Sites
Linda Sharp	UND	Hungry for Information? Evaluating Web Sites	(No change)
Cheri Smith	UND	Popular and Scholarly Journal Articles Compared	Hungry for Information? Evaluating Web Sites
Michael Fosmire	Purdue	How to Read a Scientific Paper	(No change)
Jane Kinkus	Purdue	Why Journal Articles?	(Resigned)
Alexius Macklin	Purdue	Unlocking the Web with the Right Keywords	(Inactive)
Song Yu	Purdue	Finding Authentic Chemical Spectra (IR, NMR, UV) in the Purdue University Libraries	(Resigned)

From the beginning, the three participating library educators at Earlham decided to work on the same project. Unfortunately, Earlham participants became inactive due to the heavy project workload and long-term nature of the project. Although all four library educators at Purdue worked on separate projects, only Michael Fosmire finished; he stayed with the same idea from beginning to end. The four library educators at Notre Dame originally defined separate projects but they consolidated their interests and efforts into the one idea that was originally submitted by Linda Sharp. Helen Georgas and Annie Armstrong at UIC and Sandy De Groote at UIC chose separate topics and remained with them throughout the project.

3.2   Draft Representations of Multimedia Shows

According to the project design (Table 1), the representation step was scheduled for June and July 2002. Summer vacations, summer leaves, and the business connected with the new school term slowed library educators from making progress on representations of their shows. By the end of August 2002, the PI had received only one storyboard for the eight different multimedia projects that library educators would be developing. Project participants told the PI that while

training continued, they were more focused on reinforcing what they were learning in weekly training sessions than on formulating various representations of their multimedia shows. The PI's response was to conclude weekly training sessions with an emphasis on digital sound in mid fall 2002 so that participating library educators could turn their attention to the production of the various representations of their multimedia shows.

Some educators were unsuccessful generating or took much longer than expected to generate these draft representations (i.e., Brennan, Kinkus, Macklin). All three eventually resigned from the project. Section 6 gives the reasons for their resignations, explains what went wrong, and what could be done to avoid the same thing from happening in the future.

3.3 Production Work on Multimedia Shows

According to the project schedule (see Table 1), the authoring step was scheduled to begin in August 2002. Work effort connected with Step 4 (training) was to blame for delaying most project participants from beginning production work until winter 2003.

Originally, the PI planned for library educators to do production work entirely on their own. Only three (De Groote, Fosmire, and Yu) library educators did the majority of the development on their own and two of the three (De Groote and Yu) consulted project staff developers to assist them with programming difficulties or design work. The remaining library educators relied almost entirely on support from a fulltime developer paid through LUMENS Project funds (Kinkus), external grant funds (Georgas and Armstrong), or a combination of library funds and LUMENS Project funds (Fuderer, Sharp, Smith, and Warner).

The idea to enlist a fulltime developer to do production work on library educators' projects came from the Notre Dame and UIC working groups. During the PI's first site visit to Notre Dame in September 2002, Notre Dame project participants told the PI that they would be enlisting the services of a student employed in the Library's Digital Architecture Department to do their

development work. Library funds that were used to support the student developer amounted to about a quarter-time position. When the developer graduated, the PI assigned production work to project staff member Michael Spaly. During the PI's second site visit to UIC in April 2003, the UIC working group (Georgas and Armstrong) told the PI that they had secured external grant funds to do their production work and handed the job to Michael Spaly.

To jumpstart production work on several other projects, the PI offered library educators the services a fulltime developer who was supported by LUMENS Project funds. Martin Brennan (at UIC) and Jane Kinkus (at Purdue) responded positively to the PI's offer. Michael Spaly, who had joined the Michigan project team of developers in February 2003, assumed the responsibility for the development of the Brennan and Kinkus Flash shows and relied on both these two library educators and the PI for guidance and direction especially with regard to content. Brennan later resigned from the LUMENS Project to take a position at another institution and Kinkus resigned from the project because of the difficulty handling heavy workloads connected the project and her regular job. Michael Spaly finished the development on Kinkus' show based on her original storyboard and feedback from the PI. Martin Brennan failed to generate more than an idea and audience statement so no development work was ever done on his project.

The PI's original plans charged library educators with the production of their Flash shows. Calling on the services on fulltime developers to assume the responsibility for all production work was an unexpected development in the course of the LUMENS Project. Reasons why some library educators were able or unable to do their own authoring were explored during the final step of the LUMENS Project when all project participants engaged in a dialogue to define the role of library educators in multimedia production for library-user education (see section 6).

3.4 Multimedia Shows in Production

Although four projects figured into the evaluation, this section describes the

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content of six projects because development work on these six was completed. The library educators (Kinkus and Yu) whose projects did not figure into the evaluation resigned from project due to heavy workloads and taking a position at another university, respectively.

3.4.1 Doing Research: An Introduction to the Concepts of Online Searching (Armstrong & Georgas at UIC)

"Doing Research" is available on the web at the address http://www.uic.edu/depts/lib/reference/services/tutorials/DoingResearch.shtml. The impetus for this tutorial was its developers' acknowledgment that few undergraduate students understand basic concepts when doing research online. The multimedia show covered the following concepts: how to select keywords for a topic, how to identify synonyms and related terms, the importance of the search term AND, how to formulate effective keyword searches, and how to read a citation. The show's designers, Helen Georgas and Annie Armstrong, have not only made this site available to the UIC library community generally, but they will use this site when teaching freshman English courses. Figure 1 shows the names of the five sections of the "Doing Research" site. Users can click on one of the sections to go directly to tutorial content. When a section ends, it continues with the next section's content.

Figure 1. Five sections of the "Doing Research" show

The first section entitled "Using the search term AND" introduces the Boolean operator AND. It features an interactive exercise in which users are asked to sort surrogates, i.e., photos and written descriptions, of animals into one of three categories: (1) Africa, (2) Bird, and (3) Africa AND Bird (figure 2). Some surrogates represent animals that live in Africa but are not birds, e.g., lion, giraffe, mollusk. Other surrogates represent animals that are birds that neither live in nor migrate to Africa, e.g., Atlantic Puffin, Ruby-throated Hummingbird, Scarlet Macaw. Finally, the remaining surrogates belong in the "Africa AND Bird" category because they represent birds that either live in or migrate to Africa, e.g., Egyptian Vulture, Black-crowned Night Heron. When users drag and drop a surrogate onto the wrong category, the surrogate springs back to its original presorted location and the program lets them try again.

Carefully read through the profiles below, and drag each one to the appropriate section (there are 3 sections). Pay special attention to the geographic locale and the type of animal displayed. When placing the profiles, do not let them overlap.

AFRICA

BIRD

AND

Animal: Black-crowned Night Heron
Kingdom: Animalia
Phylum: Chordata
Order: Ciconiiformes
Family: Ardeidae
Class: Aves
Genus: Nycticorax
Species: nycticorax
Geographic Locale:
North, Central, and South America; Europe; Asia; Sub-Saharan Africa.

Figure 2. Drag-and-drop exercise for the Boolean operator AND

The first section culminates in a second interactive exercise that asks users to tally the number of surrogates they placed in each category. Should users answer incorrectly, the program gives them a second opportunity to fill in the right answers. In figure 3, the user has added up the number of animals (8), birds (6), and birds that live in Africa (2). To answer these three questions correctly, users have to apply the logic of the Boolean AND operator by distinguishing between animals and birds that fulfill one or two criteria.
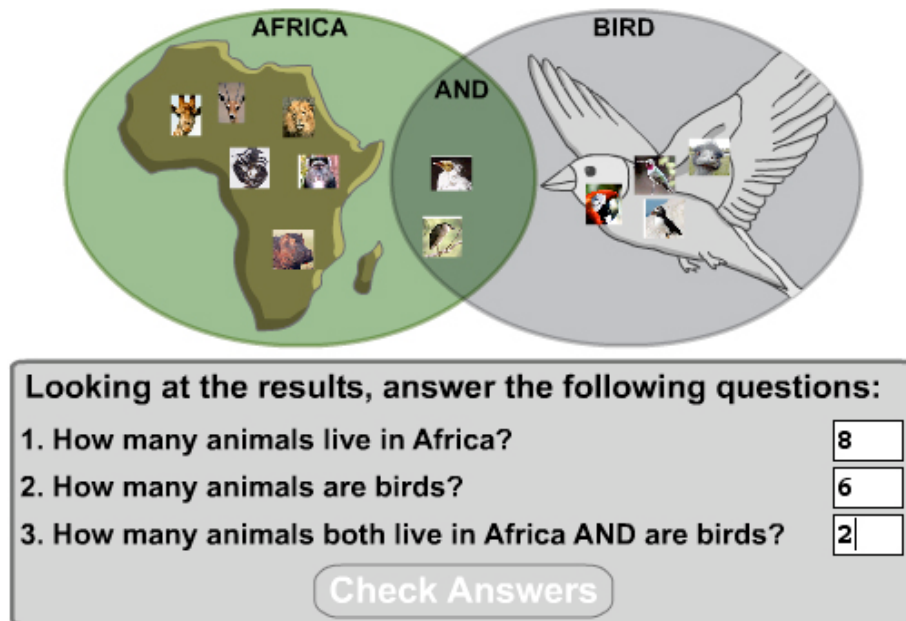
Figure 3. Reviewing the results of the
Boolean AND sorting exercise

The second section is entitled "Identifying Keywords" and it begins with a brief explanation of the research process. It then assigns users the research topic "The Representation of Women in Film," presents them with various examples of keywords, and asks them to choose the most appropriate ones (figure 4). Feedback is given when users choose less appropriate keywords. In figure 4, the user has dragged the ticket for the word "Women" into the canister. Dragging the word "Film" into the canister would complete the exercise because both are unique and suitable key words for the research topic. When users drag less appropriate words such as "of" and "representation" to the canister, the words spring back to their original positions and the tutorial gives users feedback that tells why these words are inappropriate keywords.
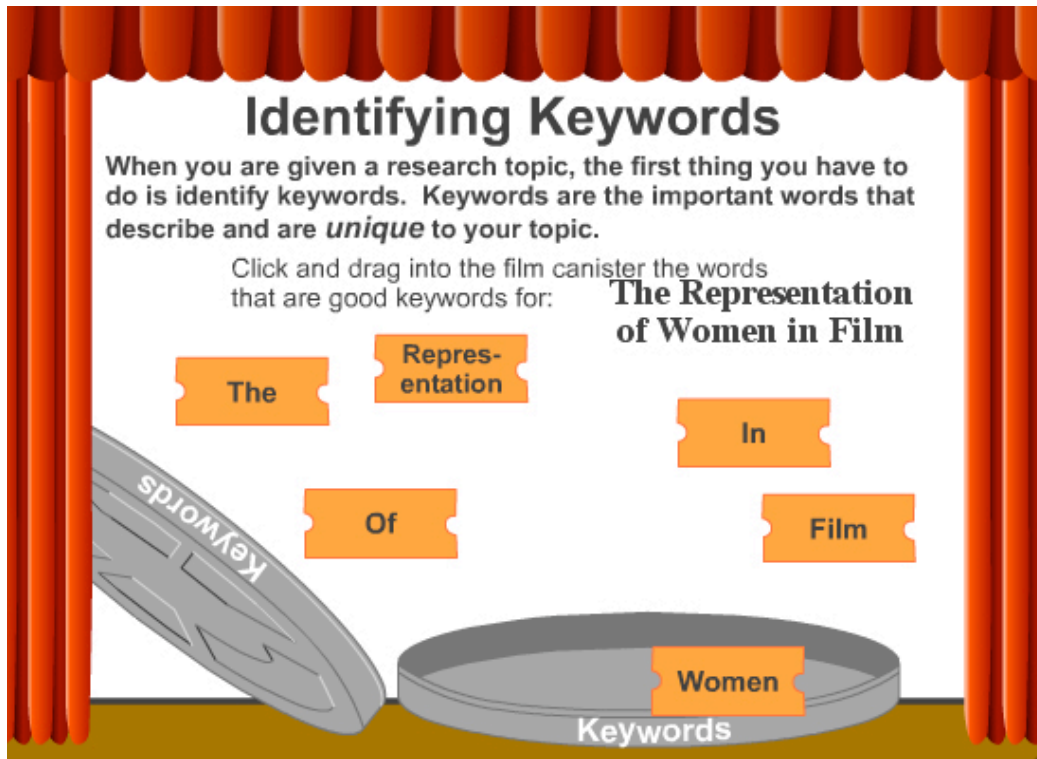
Figure 4. Choosing appropriate keywords
for the assigned research topic

Another interactive exercise is featured in the show's third section on "Thinking of synonyms and related terms." Users drag appropriate synonyms onto one of two popcorn buckets that are labeled with the facets of the research topic. For example, in figure 5, appropriate synonyms for the "Women" bucket would be "Gender," "Girls," "Feminism," and "Female" and the user has dragged three of these to the "Women" popcorn bucket. Should the user drag an inappropriate synonym to one of the labeled buckets. The inappropriate synonym springs back to its original position and the tutorial gives the user feedback telling why his or her selection was inappropriate.
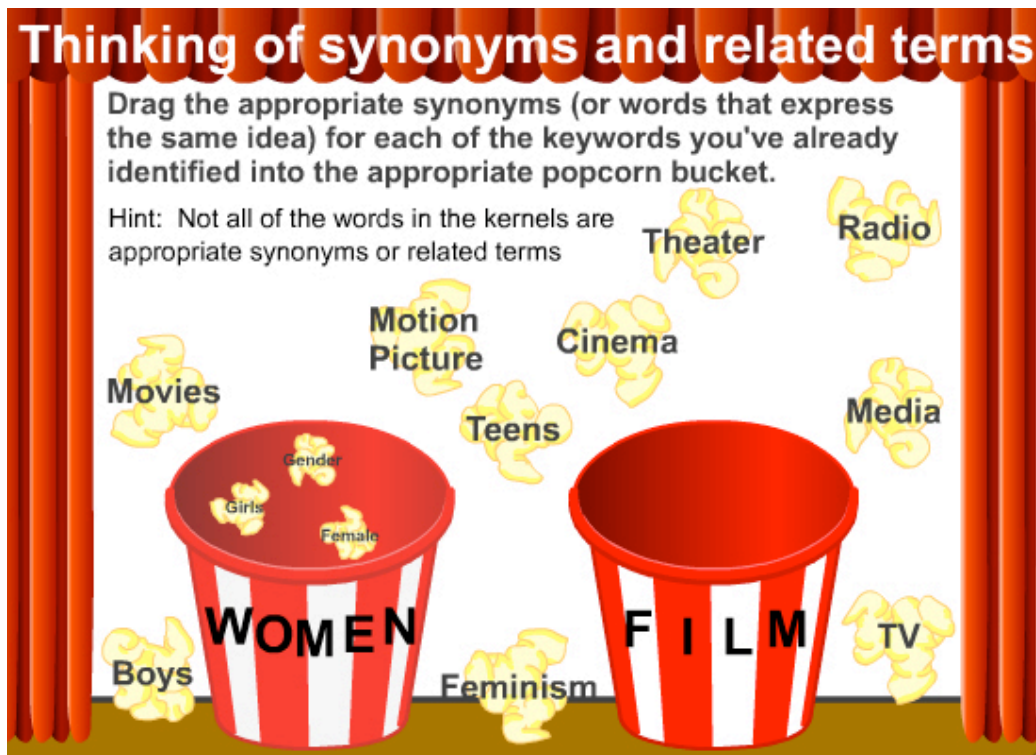
Figure 5. Choosing synonyms and related terms
for the assigned research topic

In the fourth section entitled "Examining a citation," the show explains how citations summarize the contents of books and articles. The interactive exercise in the show's final section named "Putting It All Together" demonstrates how to assess the relevance of retrieved citations vis-à-vis one's research topic. It has users dragging and dropping citations into one of three categories that describe the assigned research topic's facets.

3.4.2 Keeping Current in Your Field (De Groote at UIC)

"Keeping Current in Your Field" is available on the web at the address http://tigger.uic.edu/~sgroote/sdi/. The impetus for this web site was its designer's acknowledgment that faculty, graduate students, researchers, and residents in the health sciences want to keep current in their field but might not know about the new online current-alert services that would help them in this regard. The purpose of the "Keeping Current" multimedia show was to define "saved searches," tell users how saved searches can benefit them, and demonstrate

how to save searches and receive tables of contents from newly published journals that are indexed in Ovid and/or PubMed Cubby databases. The show's designer, Sandy De Groote, has made this site available to the UIC library community generally and publicized its availability to prospective UIC user groups such as faculty, fellows, residents, and graduate students.

Figure 6. Three content tabs in "Keeping Current"

Figure 6 shows tabs on which users click to open the show's three sections. The left tab entitled "What are Saved Searches?" describes the saved-search feature and underlines benefits such as how searchers can send saved-search results and journal tables of contents to themselves and/or their colleagues via email (figure 6). Users who click on the middle tab are given the option of viewing a demonstration of saved-search profiling in Ovid Medline or in Pub Med Cubby (figure 7).

Figure 7. Choice of Ovid Medline or PubMed Cubby

Clicking on the "Ovid Medline" button in figure 7 launches a Flash-based demonstration of profiling oneself for the Ovid Medline saved-search service. Because profiling is a complicated process, the show divides profiling into four discrete events: (1) subscribing to the saved-search service, (2) adding a new saved search, (3) choosing a journal to receive tables of contents for new issues, and (4) removing a saved search.

Ovid prompts users who choose to add a new saved search to enter keywords. For example, in figure 8, the user enters the keywords "dental caries" for his multifaceted research topic "dental caries and fluoride" into Ovid's routine for adding a new saved search.

In figure 9, the user saves the search by checking the radio button for the "AutoAlert SDI Service," names the search, enters his email address where he wants Ovid to send future search results, and selects the amount of citation information that he wants Ovid to send to him.
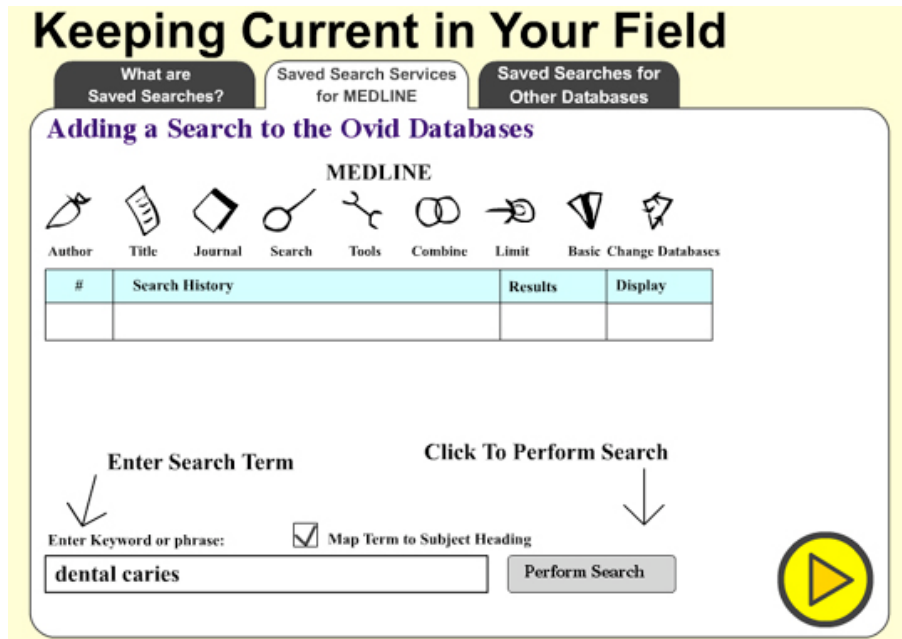
Figure 8. Conducting a search in
Ovid Medline prior to saving it
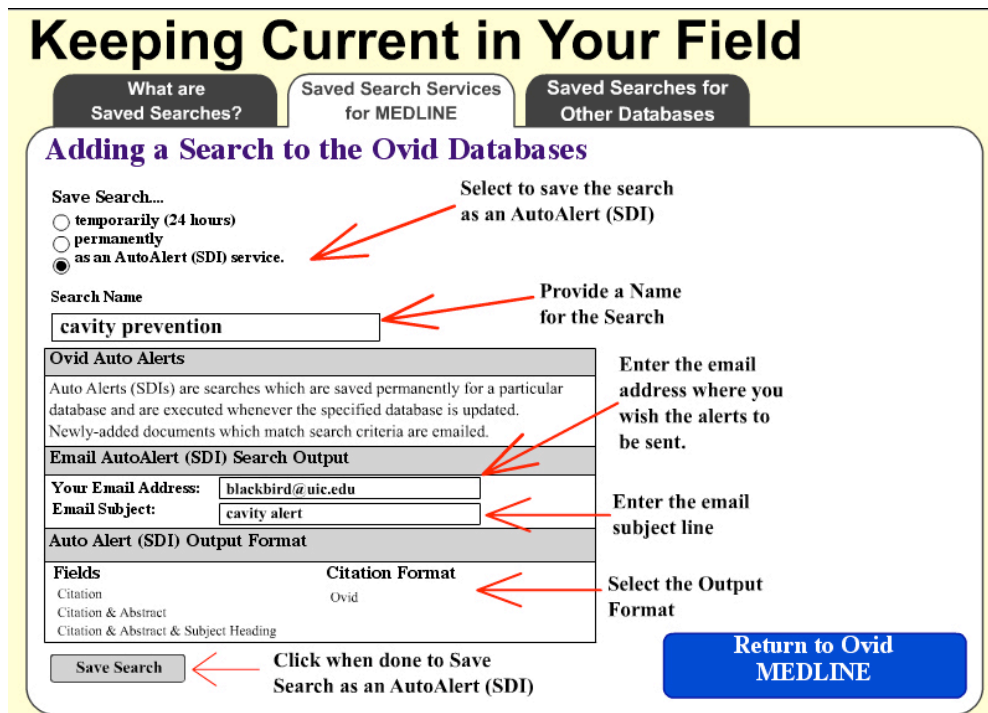
Figure 9. Saving a search in Ovid Medline

The "Keeping Current" multimedia show divides saving searches in PubMed
Cubby using the same four events that it uses for Ovid Medline. However,

instead of a Flash-based demonstration of PubMed Cubby's current-alert service, the show links to a separate tutorial published by the National Library of Medicine (NLM). Clicking on the right tab in figure 6 entitled "Saved Searches for Other Databases" launches a separate University Library-sponsored web page that enumerates saved-search services offered by database services in medicine and related disciplines.

3.4.3 How to Read a Scientific Paper (Fosmire at Purdue)

"How to Read a Scientific Paper" is available on the web at the address http://www.lib.purdue.edu/phys/inst/scipaper.html. The impetus for this web site was the designer's experience working with undergraduate students who need to expand their horizons beyond textbooks and popular science magazines to complete class assignments and projects. The purpose of "Scientific Paper" is to teach undergraduate science students how to read a scientific article from the primary literature of their field, give them strategies to boost their understanding of scientific articles, and introduce them to the different parts of scientific papers. The show's designer, Michael Fosmire, has made this site available to the Purdue library community generally. The show is also being deployed as part of information literacy instruction in several courses.

In figure 10 is the contents frame from "Scientific Paper." Mousing over the buttons on the left side produces a popup message on the right side that summarizes the contents of each chapter. This contents frame and most other frames use animation to increase the clarity of the written commentary. Figure 10 shows the summary for the first chapter called "Why?"
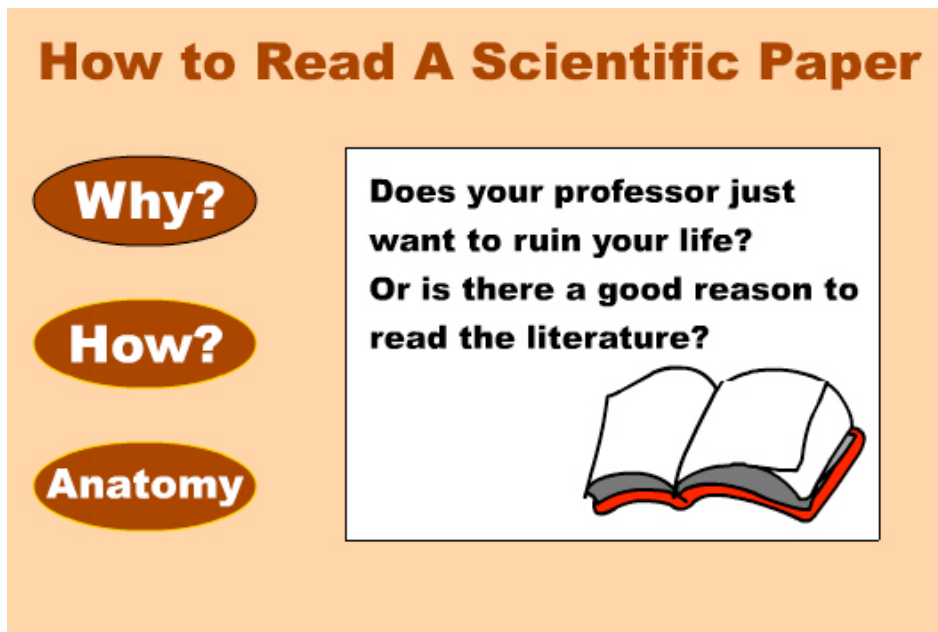
Figure 10. Contents page for "Scientific Paper"
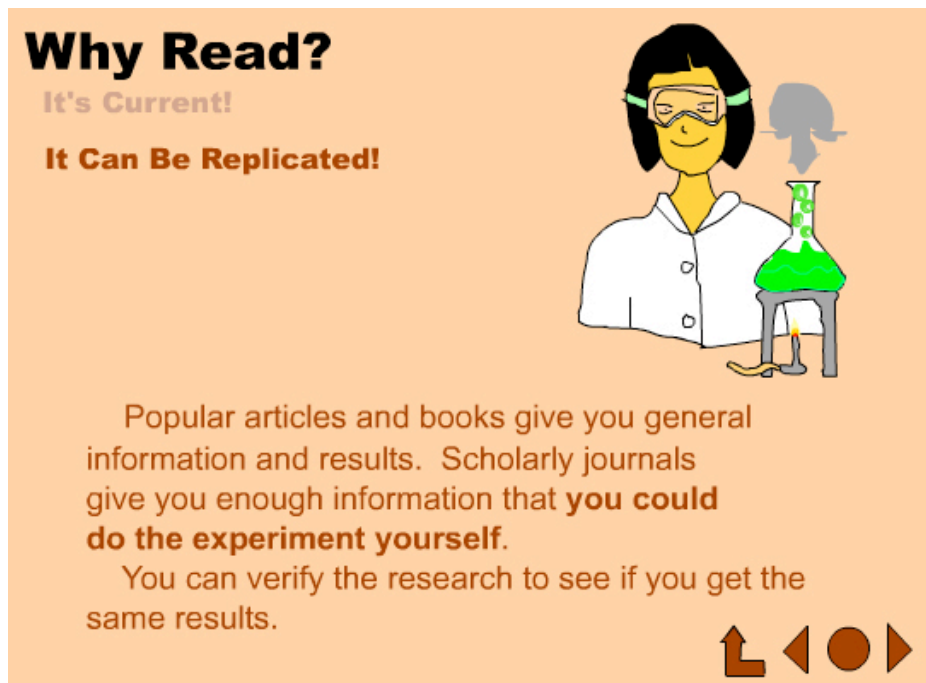
Figure 11. Read scientific papers to replicate research results

The "Why?" chapter cites three reasons why it is important for students to read the scientific literature. For example, figure 11 is a frame from the "Why?" chapter that tells students to read scholarly journals because journals articles give researchers enough information to replicate experiments and verify the author's

research findings.

The "How?" chapter gives students useful hints on how to read scientific papers. For example, it tells them not to read a paper from start to finish and to keep a scientific dictionary nearby to look up unfamiliar terms. Then it describes the key sections of scientific papers that students should read to reach a general understanding of a scholarly paper's contents. It also enumerates important questions about the paper's content that students should ask themselves to improve their understanding. Figure 12 tells students that the second-most important section of a scholarly paper is the discussion, describes the type of information that students are likely to encounter in the discussion, and lists questions that students should ask themselves about this section.

Figure 12. How to read a scientific paper's discussion section

Anatomy of a Scientific Paper

Are All Apples Red?
by
Ida Cortland

Abstract:
We examined several apples' color. Although most are red, some are not.

Introduction:
An age-old question is: are all apples red? MacIntosh (1993) thought so. G. Smith (1999) begs to differ. We hope to resolve this issue once and for all.

Methods:
We went to the local grocery store and bought one of every apple they had. We took them home and looked at them.

Results:
We found four red apples, one green apple, and two yellow apples.
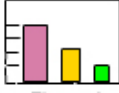
Figure 1

Discussion:
Since we found one yellow apple and two green apples, it must be true that all apples are not red. We concur with G. Smith's findings.

References:
MacIntosh (1993) *Journal of Fruit Science.* 4(3): 121-135.
Smith, G. (1999) *Apple Technology Today.* 7(3):4-8.

Pomes and You, Volume 3, Issue 4 (2003)   p. 8

Click on the Section of the Paper You want to Know More About.

Figure 13. Two-page scientific paper with six sections

The "Anatomy" chapter gives examples of the six sections that characterize scientific papers. It does this by displaying a two-page scientific paper, and inviting users to click on a section to learn more about it (figure 13).

Users who click on a section are rewarded with a one- to two-frame explanation of the section's purpose, how to use the information in the section to gain a greater understanding of the paper, and additional hints on the section's contents and its usefulness for class projects. Figure 14 details the importance of a scholarly paper's discussion section.

Figure 14. The discussion section of a scientific paper

3.4.4   Journals to the Rescue! (Kinkus at Purdue)

The impetus for "Journals to the Rescue!" was the designer's acknowledgment that medical students were unaware of the importance of identifying and reading current journal literature in addition to their textbooks and handbooks. They did not understand differences amongst the various types of information, especially handbooks, dictionaries, textbooks, and journal articles. She also recognized that medical students are action-oriented, impatient with the research process, and will sometimes use the first source they find rather than the best source. The purpose of her multimedia show was to tell graduate students from Purdue's Department of Veterinary Medicine how and why scholarly journals are published, cite important characteristics of journals that distinguish them textbooks and other formats, and emphasize the benefits of using journals for their coursework and practice.

The show's designer, Jane Kinkus, resigned from the LUMENS Project because of the difficulty juggling heavy workloads connected the project and her regular job. Michael Spaly did all development work on "Rescue" with feedback from

the PI. A link at the LUMENS Project web site connects to "Rescue" at
http://www.si.umich.edu/~ylime/lumens/journalsToTheRescue.html.

Journals to the Rescue: Saving Sparky

The latest research indicates that Quiesco Esurie can cause seizures in pure bred Yellow Labs. The recommended treatment is to simply control their eating times.
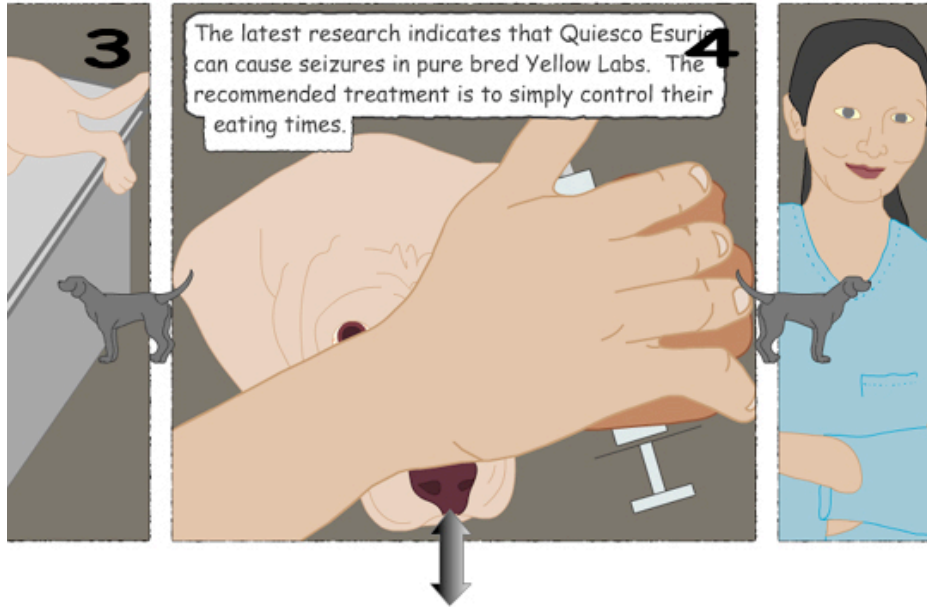
Figure 15. Intern Li stops the dangerous injection

"Rescue" is a two-tiered story in comic-strip form. The top tier tells the story of Doctors Reddy and Pearson who are about to treat Sparky, a yellow Labrador Retriever, for an ailment by giving him an old-fashioned remedy in the form of a dangerous injection. Just as the doctors are about to give Sparky the injection, their intern Miss Li, stops them and tells them that the latest research advises veterinarians to treat Sparky's ailment by controlling his eating times (figure 15).

When the doctors ask Miss Li where she found the research, she tells them she found it online in a journal to which the university subscribes (figure 16). When the story ends, Sparky is rejuvenated and the doctors happily conclude that they must subscribe immediately to online journals.

Figure 16. Subscribing to online journals

A parallel story is told on the bottom tier where the user learns about how journals are published at frequent intervals and thus contain more up-to-date information than books that are published once or revised at infrequent intervals. Figure 17 animates the interaction between brick-and-mortar libraries and subscriptions to online journals.

Figure 17. Using the library's subscriptions to online journals

Figure 18. Subscribing to online journals helps your career and patients

The parallel story concludes with a summary statement about online journals benefiting both one's career and patients (figure 18). Although "Journals to the Rescue" is not as deep and complicated as the other multimedia shows, it uses vivid information—the story of finding the safest treatment for Sparky's ailment—to underline the importance of consulting journals for current information. The show's message is "read journals for the latest information" and show content drives home this one important point.

3.4.5 Hungry for Information: Evaluating Web Sites (Fuderer, Sharp, Smith, and Warner at Notre Dame)

Laura Fuderer, Linda Sharp, Cheri Smith, and Joni Warner, the four designers of the "Hungry for Information: Evaluating Web Sites" multimedia web site, recognized that more and more students were turning to the web for information rather than using traditional library resources. They felt that they could influence how students handle the information they find on the web by advising them to look at web sites more critically. The purpose of their multimedia show was to teach first-year students to evaluate web sites by evaluating site currency, authority, coverage, accuracy, and objectivity, and packaging these aspects into the easy-to-remember C-A-C-A-O acronym. The show's designers have not only made this site available to the University of Notre Dame library community generally, but they plan to incorporate it into the curriculum for First Year Composition courses.

"Hungry for Information" has a lengthy introduction that presents definitions for the word "cacao" and the acronym C-A-C-A-O. The former is a tree that produces cacao beans that are ground and roasted for making chocolate. The latter is a method that can be used to evaluate the quality of information found on the Internet (figure 19). In fact, the "Hungry" site uses the C-A-C-A-O acronym to introduce users to five strategies for evaluating web site quality and to help them remember each strategy. Users who do not want to view the introduction can bypass it by clicking on the "Skip Intro" button on the top right corner of introduction frames.
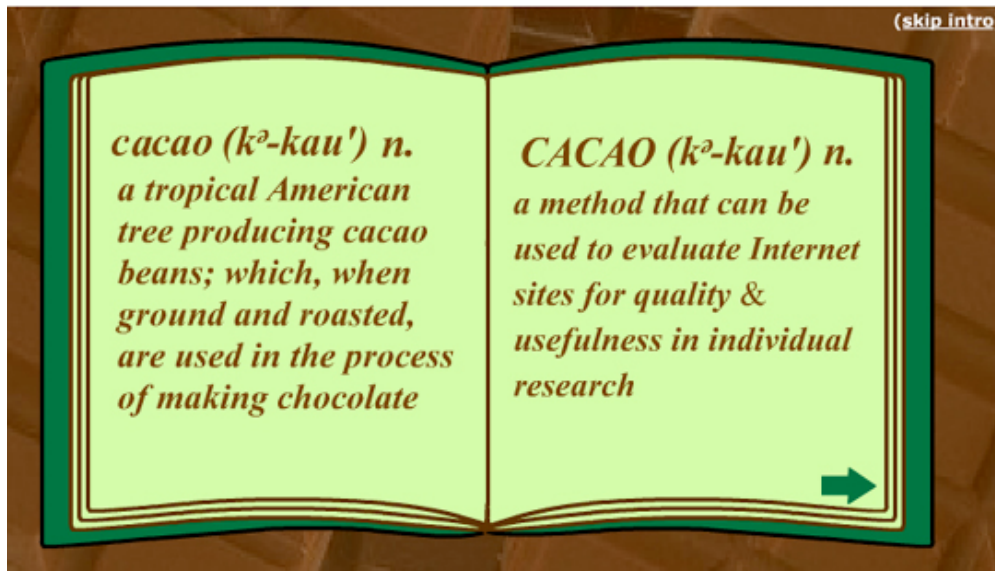
Figure 19. Definitions for the word "cacao" and acronym C-A-C-A-O

The introduction continues with examples of bogus, exaggerated, and inaccurate information that is typical of Internet web sites to emphasize to students just how important it is to evaluate web-based information. It then dissolves into a table of contents that enlists the C-A-C-A-O acronym imprinted on a candy bar and spells out the five strategies to web-site evaluation: Currency, Authority, Coverage, Accuracy, and Objectivity (figure 20).

Clicking on a strategy results in an animated sequence of frames that illustrates how to apply the strategy vis-à-vis the web information they encounter. For example, the "Currency" section tells users to look for a date that indicates the site's most recent update, a copyright note or symbol, or references to current or not-so-current events (figure 21).

Figure 20. Table of contents for "Hungry for Information"

Figure 21. Discussion of Currency

All five strategies are defined and given thorough explanations. Several discussions link to web sites that illustrate deficiencies in terms of the quality and trustworthiness of their information. It is hoped that students who examine these sites will become more informed consumers of web-based information and apply the strategies that the "Hungry for Information" web site suggests to evaluate web-based information. Figure 22 is the introductory frame of the Objectivity strategy; it cites two very different web sites and encourages users to click on the

links to navigate to the sites.

Figure 22. <u>O</u>bjectivity discussion on "Hungry for Information"

Figure 23 follows up with questions that users should ask themselves about these two and other web sites when applying the Objectivity strategy.

Figure 23. Following up the <u>O</u>bjectivity discussion with questions

3.4.6 Finding Authentic Chemical Spectra (IR, NMR, UV) in the Purdue University Libraries (Yu at Purdue)

"Finding Authentic Chemical Spectra" is available on the web at the address

http://www.lib.purdue.edu/chem/chemspec/index.html. Spectroscopy is the study of the interaction of matter and light. It is important to many areas of chemistry and physics. A major application of spectra information is the determination and variation of chemical structures so that being able to find the spectra information and compare it with the data obtained from lab work is a critical skill for students who are taking chemistry classes.

The purpose of "Finding Authentic Chemical Spectra" is to inform undergraduate students who are enrolled in chemistry classes at Purdue University about print and electronic resources for spectra information especially to teach them how to find the spectra for these resources when they have the name, structure, CAS Registry Number, or formula of a particular chemical compound in hand. The multimedia show could also assist instructors; they could tell students to use the site as a backup to their in-class presentations on finding spectra. The show's designer, Song Yu, finished development in summer 2003 and made a link to the show on the Purdue Chemistry Library's web site. Unfortunately, she was unable to participate in the evaluation of the site because she left Purdue to take a new position at another university.

"Spectra" has three major chapters: IR, NMR, and UV. These chapters have two main components, one named "Find" to learn how to find the spectrum, and a second named "Resources" to locate resources in print or electronic format at the Purdue University Libraries. Clicking on "Find" in the IR chapter results in a brief explanation of IR (Infrared) Spectroscopy (figure 24).

To find the authentic IR spectrum, users need to know a compound's chemical name, molecular formula, CAS registry number, or structure (figure 25). Users click on the type of information they have in hand and "Spectra" demonstrates how to find the IR spectra in both print and electronic resources.

Figure 24. Explanation of IR spectroscopy
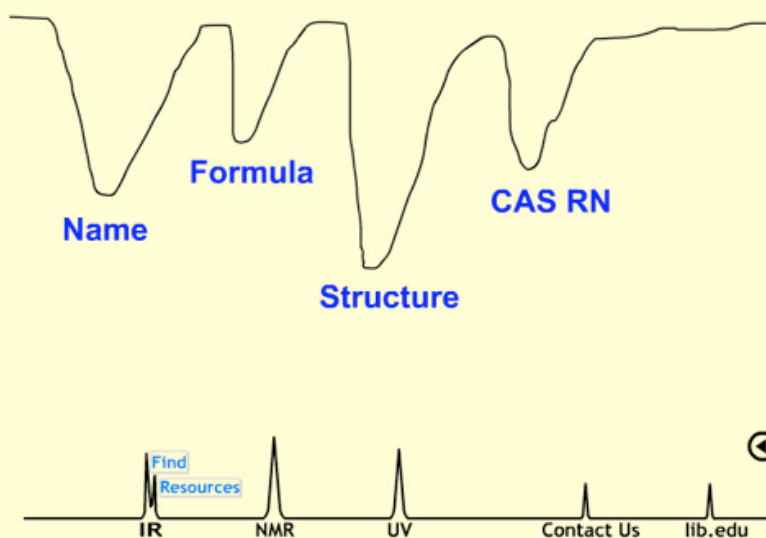
Figure 25. Ways of finding authentic IR spectrum

Figure 26 shows the end result of searching for the compound named 2-

Benzoylbenzoic acid in the electronic resource named "NIST Chemistry WebBook." Users can compare the standard IR spectrum of 2-Benzoylbenzoic acid with the spectrum they have in hand to determine if the compounds are the same.
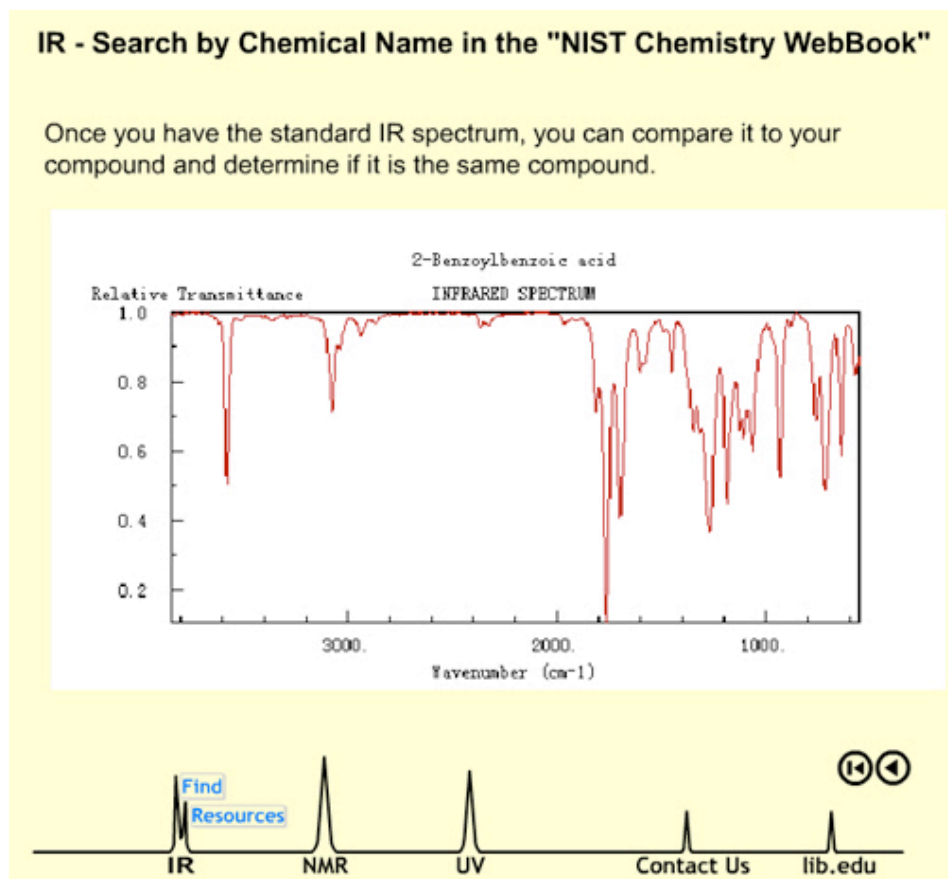
Figure 26. Spectrum for 2-Benzoylbenzoic acid

Clicking on the show's "Resources" link produces a frame that gives users the option of viewing lists of resources for IR, NMR, and UV Spectroscopy. In the case of electronic resources, users can link directly from "Spectra" to a listed resource. For example, three electronic resources are listed under IR Spectroscopy and all three have links to Internet addresses (figure 27). Clicking on a linked resource will enable users to connect to the resource and start searching for spectra. Under the "Resources in Print" tab are listed print resources that users can consult at Purdue's Chemistry Library. Under the "Identification" tab are listed several handbooks in the Library's reserve or in reference collection to

which library users can refer for additional information on the identification of infrared spectra of inorganic compounds, organic salts, organic molecules, and coordination compounds.

Figure 27. Links to electronic resources in IR spectroscopy

3.5 Usability Testing

Of the six projects described in section 3.4, four projects were submitted to usability tests. These same four projects also figured into the evaluation phase of the project (see sections 4 and 5). In advance of testing, library educators submitted their usability plans and instruments to their university's IRB (institutional review board) and received approval to do testing.

Participating library educators recruited six to ten subjects for usability tests. They posted signs in the library and other university buildings where prospective subjects were likely to be found; the signs briefly described the usability tests and told prospective subjects how to contact library staff to make appointments. In

the testing area, subjects were given consent forms to sign prior to the usability test. An interviewer administered the questionnaire. The questionnaire first collected demographic information, for example, answers to questions about how frequently subjects used a web browser, searched for information in the library, etc. The interviewer then launched the multimedia show, invited the subject to use it, and asked the subject to speak out loud while using the show. The interviewer observed the subject using the multimedia show, listened to the subject's out loud thoughts, and wrote notes on the questionnaire form as needed.

When subjects were done using the site, the interviewer asked more questions. Most questions were open ended so that subjects could describe the difficulties they encountered and information they failed to understand. In Appendix A is the blank usability questionnaire that interviewers administered to usability test subjects at the University of Notre Dame. Except for minor differences in the content of the initial questions that collected information on demographics, usability questionnaires were the same across all data-collection sites.

4 Testing Students' Knowledge of Library Resources

In section 4 are data analyses that specifically address the project's third objective:

• Test authored sites to determine whether interactive multimedia Web sites are effective vehicles for conveying library-user education content

4.1 Experimental Methodology

Originally, the proposal described an evaluation that would compare the traditional instructional methods with the interactive multimedia show that library educators developed during the course of this project. For example, one could compare undergraduate students' knowledge about reading a scientific paper following an oral presentation on this subject to students who are enrolled in a science class and following their use of Purdue's interactive multimedia show on this topic.

The published comparisons that media-effects researchers have conducted over the years came to the attention of the PI. These researchers started with comparisons of text-only stories versus text-and-picture stories (Levie & Lentz 1982). More recent studies compare interactive multimedia with other instructional methods, e.g., text and pictures, print, video, animation, and web-based multimedia (Bétrancourt & Tversky 2000). When compared to traditional instructional methods, researchers have expected newer methods including multimedia and animation to facilitate learning but experimental results have shown no effect or the opposite effect (Rieber & Hannafin 1988; Rieber 1989; Surber & Leeder 1988; Kinzer, Sherwood & Loofbourrow 1989; Palmiter, Elkerton & Baggett 1991; Large et al. 1994; Crosby & Iding 1999; Schnotz & Grzondziel 1999). Results have been so dismal that they have sparked a lively

debate amongst educational technologists regarding the future of media-effects research.

The PI sought an alternative to a media-effects experiment to evaluate library educators' multimedia shows because so many of these experiments failed to yield positive effects. At UIC, Notre Dame, and Purdue, she opted to test students about their knowledge of online research concepts, evaluating web sites, and reading scientific papers, respectively, before and after using multimedia shows. She expected subjects' mean test scores to improve on the post-test administration as a result of using these interactive multimedia web sites.

The library educators who were responsible for the development of three of the four multimedia shows (Armstrong & Georgas at UIC; Fosmire at Purdue; Fuderer, Sharp, Smith, & Warner at Notre Dame) gave subjects pretests and post-tests to assess the extent to which subjects learned about library resources as a result of using their particular multimedia show. They recruited subjects by posting flyers in campus buildings where undergraduate students attend classes and labs. Flyers gave brief information about the project and contact information. Prospective subjects called or emailed listed contacts to set up a time to take the tests.

When subjects arrived at the testing site, they were given a consent form to read and sign before tests began. Subjects were then given a pretest to assess their knowledge of the subject matter on the multimedia show. Each questionnaire contained 10 multiple-choice questions about multimedia content followed by five questions that collected demographic information. At UIC, library educators Annie Armstrong and Helen Georgas gave subjects a pretest that tested their knowledge of online research concepts (Appendix B). At Purdue, Michael Fosmire pretested subjects about reading a scientific paper (Appendix C). At Notre Dame, Laura Fuderer, Linda Sharp, Cheri Smith, and Joni Warner pretested subjects about evaluating web sites (Appendix D).

After completing pretests, subjects used the multimedia site for fifteen to thirty minutes. Afterwards, they completed a post-test that asked them to answer

questions that were comparable in terms of content and difficulty to pretest questions. Each post-test questionnaire was divided into three parts: (1) part 1 contained 10 multiple-choice questions about multimedia content, (2) part 2 listed five questions that asked subjects to rate the multimedia show on several aspects such as the usefulness of its information, the amount of difficulty subjects think they would have the next time they had to search (at UIC) or read a scientific paper (at Purdue) or evaluate a web site (at Notre Dame), and (3) part 3 was a series of closed- and open-ended questions that asked subjects about their likelihood of visiting the multimedia show in the future. Parts 2 and 3 were the same across the data-collection sites so that comparisons could be made. Into Appendixes E, F, and G are inserted post-test questionnaires for the UIC, Purdue, and Notre Dame evaluations, respectively. Participation in the interviews was completely voluntary. Subjects were paid $20 (at Purdue and Notre Dame) or $25 (at UIC) for their involvement even if they skipped questions or withdrew prematurely from the study.

4.2   Subjects' Demographics

Data collectors at UIC, Purdue, and Notre Dame met the recruiting target of 30 subjects. Table 6 summarizes their recruited subjects' gender. At Notre Dame, the numbers of males and females were about the same. At UIC, 40% of respondents were males and 60% were females. At Purdue, the number of males was over three times larger than the number of females. The reason for the larger number of males reflects the nature of the Purdue student population with larger numbers of males especially in scientific and technical disciplines.

Table 6. Gender of Recruited Subjects

Library	Males		Females	
	No.	%	No.	%
UIC	12	40.0	18	60.0
Purdue	23	76.7	7	23.3
Notre Dame	16	53.3	14	46.7
Total	30	100.0	30	100.0

At UIC, Purdue, and Notre Dame, data collectors were targeting undergraduate students, and at Notre Dame, they were especially targeting freshmen. At UIC and Notre Dame, the majority of respondents were freshmen (56.7% and 80%, respectively). At Purdue, subjects were mostly upperclassmen (63.3%). Very small numbers of graduate students participated in the study at Purdue and Notre Dame. Table 7 summarizes statistics on class rank.

Table 7. Class Rank of Recruited Subjects

Library	UIC		Purdue		Notre Dame	
	No.	%	No.	%	No.	%
Freshmen	17	56.7	2	6.7	24	80.0
Sophomores	4	13.3	5	16.7	1	3.3
Juniors	6	20.0	10	33.3	2	6.7
Seniors	3	10.0	9	30.0	1	3.3
Graduate students	0	0.0	4	13.3	2	6.7
Total	30	100.0	30	100.0	30	100.0

Pretests at UIC, Purdue, and Notre Dame asked subjects whether they'd attended library-sponsored workshops on library resources and services. Table 8 shows that the majority (83.3%) of recruited Notre Dame subjects had attended one or more workshops. Results were different for UIC and Purdue subjects where the majority had never attended a library workshop.

Table 8. Number of Workshops

Library	UIC		Purdue		Notre Dame	
	No.	%	No.	%	No.	%
None	27	90.0	19	63.3	5	16.7
One	3	10.0	9	30.0	16	53.3
Two	0	0.0	2	6.7	8	26.7
Three or more	0	0.0	0	0.0	1	3.3
Total	30	100.0	30	100.0	30	100.0

In terms of major fields of study, subjects cited a wide variety of specific fields across the sciences, social sciences, and humanities. Several students listed two or

three majors. There was no general trend toward one particular major at any of the data-collection sites.

4.3   Learning about Library Resources and Services

Table 9 summarizes the results of a one-sample t-test that tested subjects' learning about library resources and services, measured as the pretest to post-test change in score. At Notre Dame, subjects averaged 6.233 correct answers on the pretest and 8.966 correct answers on the post-test. The difference of 2.733 (Table 9, row 4, column 3) was statistically significant (from 0) at the p < .001 level (Table 9, row 4, column 7). At Purdue and UIC, the results were the same but the differences between pretest and post-test scores was not as dramatic. Purdue subjects averaged 7.666 correct answers on the pretest and 9.433 correct answers on the post-test. The difference of 1.767 (Table 9, row 3, column 3) was statistically significant at the p<.001 level l (Table 9, row 3, column 7). At UIC, subjects averaged 7.138 correct answers on the pretest and exactly 9 correct answers on the post-test. The difference of 1.862 (Table 9, row 2, column 3) was statistically significant at the p<.001 level l (Table 9, row, 2 column 7).

Table 9. One-sample T-test Results: Knowledge of Library Resources and Services

School	No.	Mean	Standard deviation	T	Degrees of Freedom	Significance
UIC	29*	1.862	1.48	6.769	28	p<.001
Purdue	30	1.767	1.25	7.737	29	p<.001
Notre Dame	30	2.733	2.05	7.303	29	p<.001

*Excludes one outlier that may bias results of statistical tests.

At all three libraries, subjects' post-test scores improved significantly over their pretest scores. On the basis of this empirical evidence, project staff and participating library educators are confident that interactive multimedia web sites are effective vehicles for conveying library-user education content. A more rigorous methodology would test subjects again one or two weeks after their use of the multimedia sites to determine whether subjects were retaining important

library-use information but time constraints, logistical difficulties connected with scheduling subjects for a second test, and budget limitations made this impossible to do.

In a follow-up analysis, data were analyzed to determine whether demographic variables such as gender or class rank affected the results. At both Purdue and Notre Dame, males scored slightly better than females in terms of the differences between their pretest and post-test scores (Table 10, column 3) but the differences were not significant (Table 10, column 7). At UIC, females scored slightly better than males (Table 10, column 3) but, again the difference was not significant (Table 10, column 7) Thus, gender did not have an impact on subjects' knowledge of library resources and services.

Table 10. Independent Samples T-test Results:
Library Knowledge and Gender

School	No.	Mean	Standard Deviation	T	Degrees of Freedom	Sig.
UIC						
Females	17	2.118	1.364	1.110	27	p<.277
Males	12	1.500	1.624			
Purdue						
Females	7	1.429	1.397	-.812	28	p<.424
Males	23	1.869	1.217			
Notre Dame						
Females	14	2.357	2.061	–.938	28	p<.356
Males	16	3.065	2.048			

In terms of class rank, an Analysis of Variance (ANOVA) demonstrated that there were no significant differences between pretest and post-test main scores at all three library sites (Table 11). This meant that freshman or sophomores did not score higher than upperclassmen or graduate students on pre- or post-tests.

Table 11. ANOVA Results: Library Knowledge and Class Rank

Library	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
UIC					
Between groups	.448	3*	.149	.061	p<.980
Within groups	61.000	25	2.440		
Total	61.448	28			
Purdue					
Between groups	3.167	4	.792	.469	p<.758
Within groups	42.200	25	1.688		
Total	45.367	29			
Notre Dame					
Between groups	8.908	4	2.227	.493	p<.741
Within groups	112.958	25	4.518		
Total	121.867	29			

*3 degrees of freedom in the UIC ANOVA due to the absence of the graduate students group.

4.4 Using Interactive Multimedia Shows

Post-test questionnaires asked subjects to rate their experience using interactive multimedia shows on a scale of 0 to 10.

Figure 28 summarizes subjects' responses to the question "On a scale of 0 (not familiar) to 10 (very familiar), please rate how familiar you were with the information presented in the _____ tutorial." At UIC, Purdue, and Notre Dame, the names of the tutorials—"Doing Research," "How to Read a Scientific Paper," and "Hungry for Information," respectively—were inserted into the blank. Subjects could also choose the response category "No Opinion."
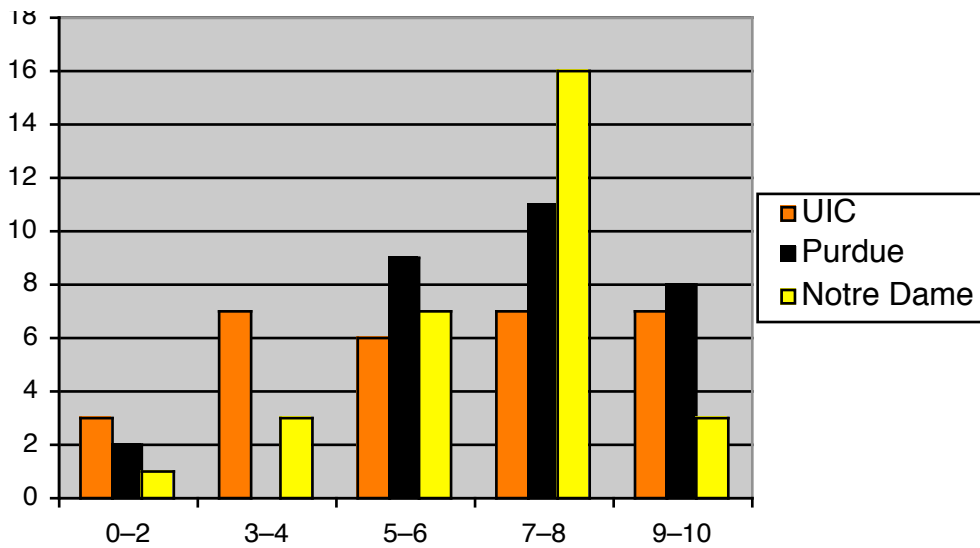
Figure 28. Subjects' ratings for familiarity with tutorial content

The mean familiarity ratings given by subjects at Purdue and Notre Dame were higher (7.0 and 6.7, respectively) than the mean ratings given by subjects at UIC (6.1). Also, familiarity ratings given by UIC subjects were spread rather evenly in low, medium, and high ratings whereas Notre Dame subjects especially registered familiarity ratings at the medium and high areas of the range.
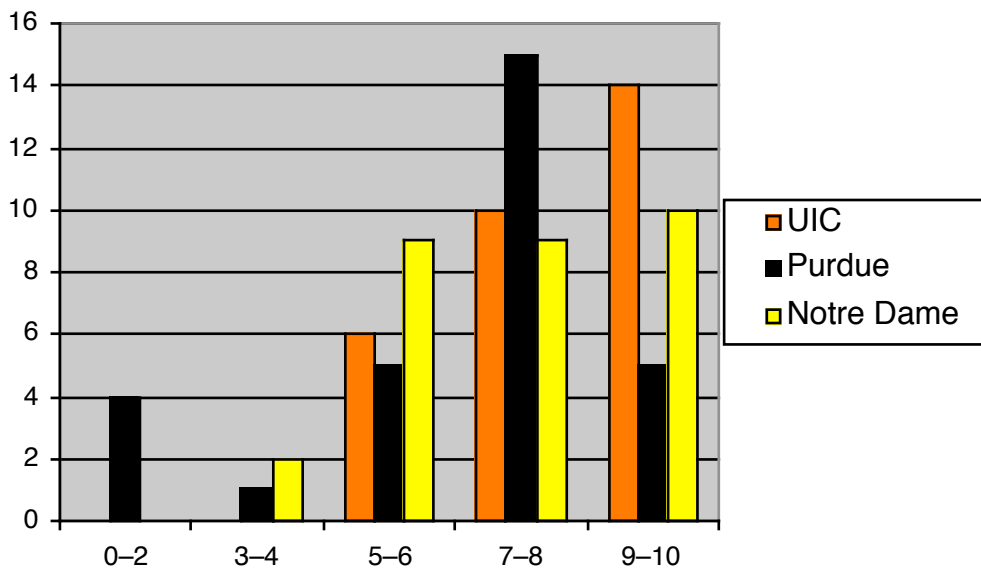
Figure 29. Subjects' ratings for usefulness of tutorial content

Figure 29 summarizes subjects' responses to the question "On a scale of 0 (not useful) to 10 (very useful), please rate how useful the information presented in the ___ tutorial was to you. A "No Opinion" response category was provided.

UIC subjects were especially enthusiastic in terms of rating the usefulness of multimedia-show content. Almost half (46.7%) gave the highest (10) rating or next to highest (9) rating and the mean rating was 8.1. Notre Dame subjects were not far behind in terms of their enthusiasm. A third (33.3%) of Notre Dame subjects gave the highest (10) or next to highest (9) rating and the mean rating was 7.5. The majority of Purdue subjects rated multimedia-show content 7 or higher; the mean rating was 6.6. Five Purdue subjects (16.7%) gave ratings of 4 or less.
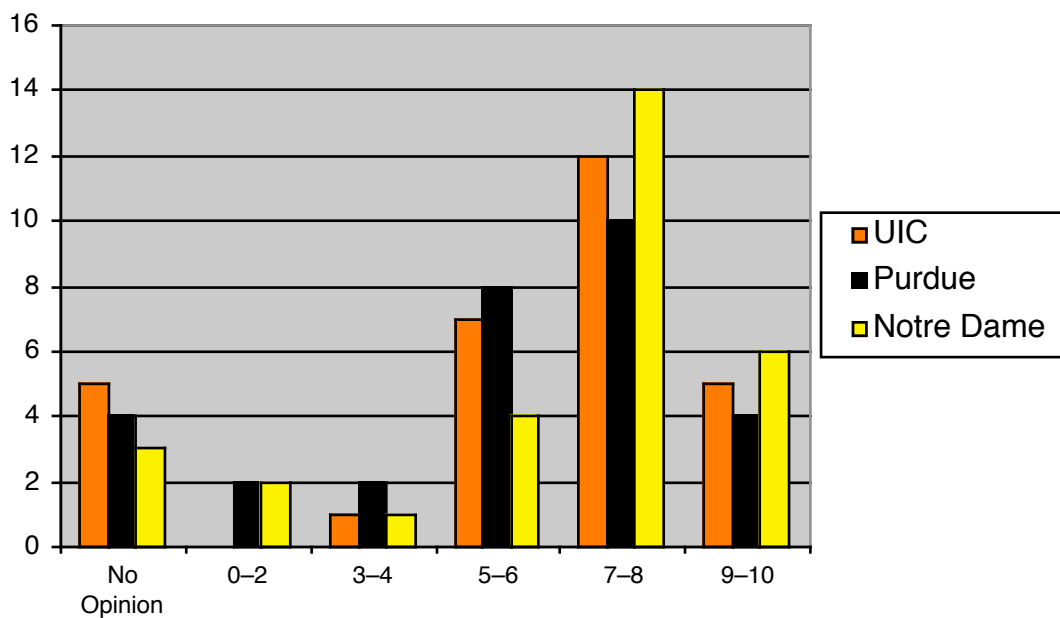
Figure 30. Subjects' ratings for the difference in character

Figure 30 summarizes subjects' responses to the question "On a scale of 0 (not different) to 10 (very different), please rate how different the character of the _____ tutorial was from other web sites or tutorials you've used to learn about academic topics." A "No Opinion" response category was provided.

Subjects at both UIC and Notre Dame were mildly positive about a difference in character between the interactive multimedia site they used in this experiment from other web sites and tutorials. Their ratings averaged 7.2 and 7.0, respectively. Purdue subjects were cooler about their ratings. Their ratings

averaged 6.4 for this question.

A handful of subjects at the three libraries voiced "no opinion" on this topic. Since the questionnaire did not probe as to the reasons for their "no opinion" response, we can only speculate on their reasons such as these subjects rarely use web sites with library-use information, rarely use tutorials generally, or did not remember comparable web sites that they have used.
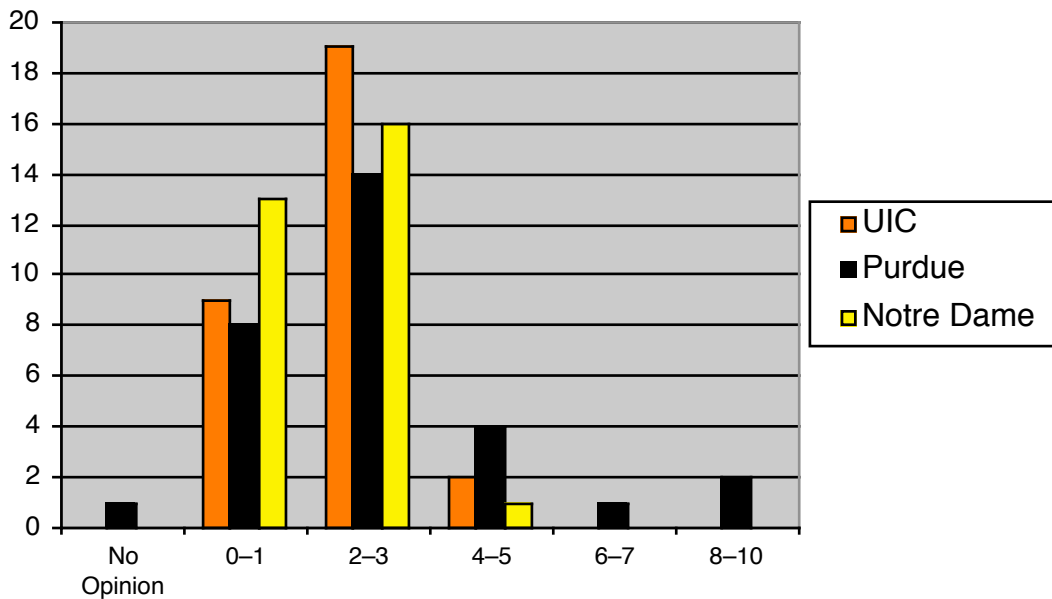
Figure 31. Subjects' ratings for the amount
of difficulty doing this task

Figure 31 summarizes subjects' responses to the question "On a scale of 0 (no difficulty) to 10 (a great deal of difficulty), please rate the amount of difficulty you think you will have the next time you have to ___." At UIC, the text "search for information on a research topic" replaced the blank. At Purdue, the text "read a scientific paper" replaced the blank. At Notre Dame, the text "evaluate a web site" replaced the blank. A "No Opinion" response category was provided.

Except for a handful of Purdue subjects, few felt they would have difficulty doing this task in the future. At UIC, Purdue, and Notre Dame average ratings were 1.9, 2.6, and 1.8, respectively. Only at Purdue did a few subjects think that they would have difficulty with this task in the future.

Figure 32 summarizes subjects' responses to the question "On a scale of 0 (no enjoyment) to 10 (A great deal of enjoyment), please rate how enjoyable it was to learn about ___." At UIC, the text "how to search for information on a research topic using the 'Doing Research' tutorial" replaced the blank. At Purdue, the text "how to read a scientific paper using the 'How to Read a Scientific Paper' web site" replaced the blank. At Notre Dame, the text "how to evaluate a web site using the 'Hungry For Information' web site" replaced the blank. The "No Opinion" response category was also an option.
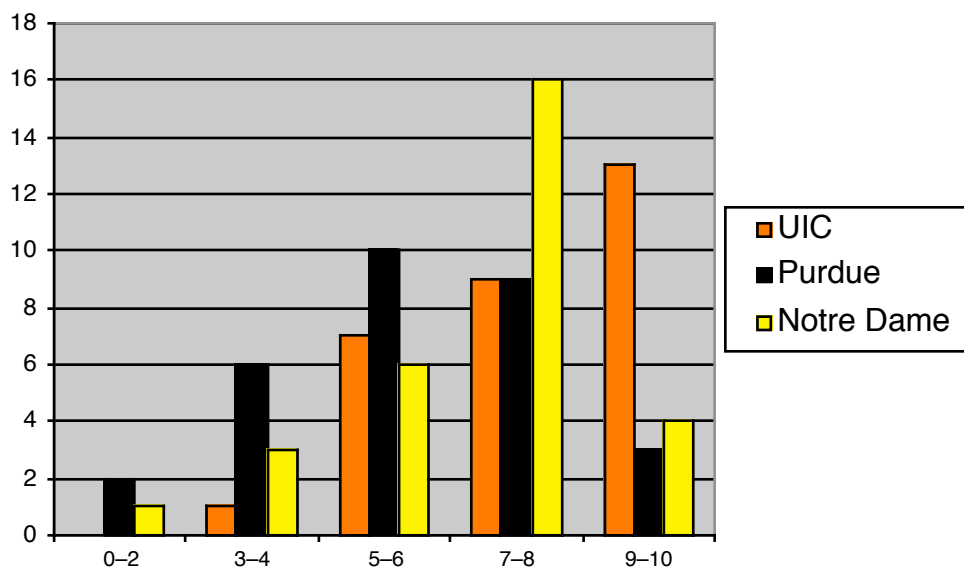
Figure 32. Subjects' ratings for enjoyment
learning about this topic

Subjects at the three libraries did not respond the same way to this question. At UIC, the number of subjects giving positive ratings increased steadily until it reach a high of 13 subjects responding with the highest ratings of 9 (3 subjects) and 10 (ten subjects). The mean rating from UIC subjects was rather high at 8.1. At Purdue, subjects were somewhat negative about their enjoyment. The average rating was 5.6, a little above the midpoint; a third of subjects rated their enjoyment at 5 or less. At Notre Dame, subjects were more positive about their enjoyment. The average rating was 6.8. Two-thirds of Notre Dame subjects gave ratings of 7 or higher. In the absence of a probe that asked subjects to explain

their ratings, we can only speculate on the reasons for their ratings. UIC's show on online searching concepts featured more interactivity than the other two shows and this interactivity could have been a prominent source of enjoyment for UIC subjects. Purdue's designer infused his show with some sarcastic humor in an attempt to lighten the presentation of otherwise dull, text-based material. Perhaps Purdue users who did not like this type of humor and would have preferred a more straightforward treatment were the ones giving this show low ratings for enjoyment.
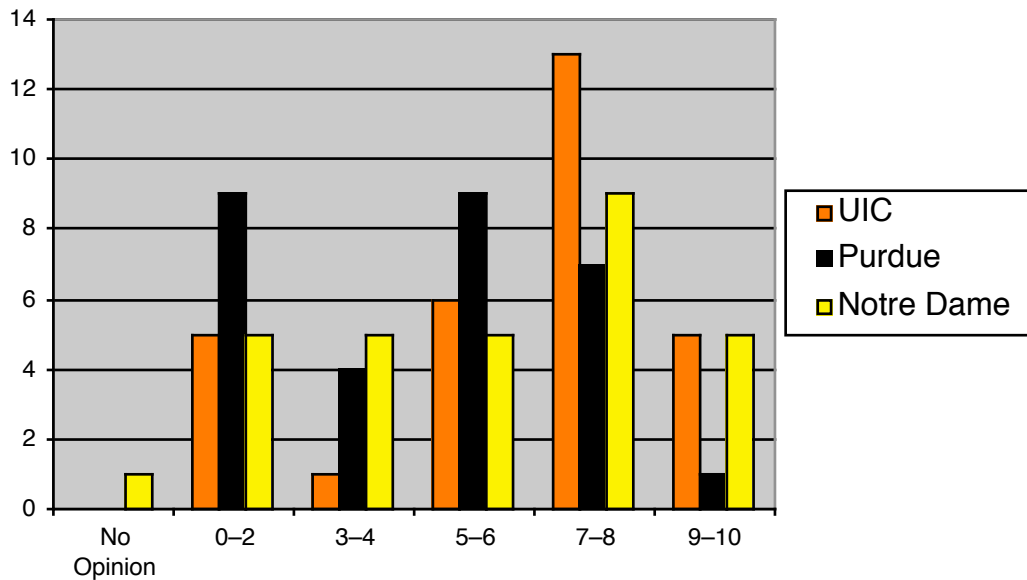
Figure 33. Subjects' ratings for a change in confidence

Figure 33 summarizes subjects' responses to the question "On a scale of 0 (no change in my confidence) to 10 (A great deal of change in my confidence), please rate the amount of change in your confidence in your ability to ___." At UIC, the text "how to search for information on a research topic" replaced the blank. At Purdue, the text "read a scientific paper" replaced the blank. At Notre Dame, the text "evaluate a web site" replaced the blank. Once again, subjects could choose the "No Opinion" response category.

The results for this question were not especially promising because averages at all three sites were centered around the midpoint of 5 (UIC, 6.2; Purdue, 4.5; Notre

Dame, 5.6). At Purdue, 50% of subjects rated the change in their confidence at 5 or lower. At Notre Dame, this percentage was lower at about 40% but it still represented a sizable number of subjects. Subjects' lukewarm ratings to this question made us disappointed about the ability of the multimedia web sites to effect a change in confidence. We should have asked subjects about their confidence prior to using the tutorial, then we could have compared before and after responses to determine whether their ratings changed as a result of using the tutorial. In the absence of these data, we cannot say that using the tutorial was responsible for higher confidence ratings. We can say, however, that subjects at all three sites were at a low-medium level of confidence about the difficulty that they would have accomplishing the task that was the subject of the tutorial.

The experimental results demonstrated an increase in subjects' knowledge about library resources and services as a result of their use of these web sites. So, although using the web sites did not raise their confidence, it did result in increased knowledge.

4.5 Subjects' Future Use of Interactive Multimedia Shows

Post-test questionnaires asked subjects about their future use of interactive multimedia shows through both closed- and open-ended questions. Table 18 summarizes subjects' responses to the question "How likely are you to consult the ___ web site in the future? The name of the multimedia show replaced the blank line at the three library sites. " Follow-up questions asked subjects to cite reasons why they would or would not consult the site in the future.

Of the three data-collection sites, subjects at UIC were most likely to revisit the multimedia show in the future. In fact, almost half were likely to revisit this online research concepts show. Amongst those likely to revisit the site, four themes were mentioned prominently: (1) the site could serve as a useful memory aid, (2) it was clear and easy to use, (3) it was fun to use, and (4) its content would be a valuable for future reference.

Table 12. Likelihood of Revisiting these Multimedia Web Sites

Rating	UIC		Purdue		Notre Dame	
	No.	**%**	**No.**	**%**	**No.**	**%**
Very likely	4	13.3	1	3.4	2	6.7
Somewhat likely	10	33.3	7	23.3	8	26.7
Somewhat unlikely	12	40.0	12	40.0	13	43.3
Very unlikely	4	13.3	10	33.3	7	23.3
Total	30	100.0	30	100.0	30	100.0

At Purdue and Notre Dame, between a quarter and a third of subjects were likely to revisit the multimedia show in the future. Some of the same themes emerged at these sites, e.g., a useful memory aid, valuable content. One new theme was teaching others about this topic.

Large proportions of subjects (three-quarters at Purdue, two-thirds at Notre Dame, and more than half at UIC) were not likely to consult these multimedia web sites in the future. At Purdue, typical reasons and the number of subjects (in parentheses) with reasons why they would not revisit the "Reading a Scientific Paper" web site were:

- Subjects already knew how to read a scientific paper. (9)

- Subjects learned what was on the site and didn't need to revisit it. (5)

- Subjects don't read scientific papers. (5)

Other reasons cited by single individuals were:

- "I'm not the type of person to look stuff like that up and I basically know how to read a scientific paper."

- "I think it's pretty straightforward and self explanatory about how to do it."

- "It really does not contain very much useful information for me. In addition, it makes assumptions about me that are not very good assumptions, i.e., since I am not a grad student, I have no reason to

understand the methods section."

A few subjects' comments centered on the Flash multimedia authoring program and the difficulty of navigating Flash sites:

- "The Flash is good, but it's harder to go back than with a normal HTML page. The info is fairly static. It is good material, but once learned, there is no reason to revisit."

- I don't want to wait 3 slides of Flash to get the data I want. Have [an] HTML transcript available too."

Subjects at Notre Dame who reported that they would not revisit the "Hungry for Information" multimedia show cited some of the same reasons as Purdue subjects, viz., they already knew the site's information regarding evaluating web sites (7) or the information was common sense and easy to remember (10). Other comments from individuals were:

- "I'm graduating and won't have to do academic work."

- "The information was clearly presented and helpful but i[t] was also fairly common sense based and I wouldn't need to consult this site again to help in evaluating web sites."

- "It will be easy to remember the information learned today."

- "Because I feel like I am fairly good at evaluating web sites already."

- "Much of it [I] have already learned and can remember easily. Some of it, though, would be useful to check again."

Unlike subjects at Purdue, subjects at Notre Dame did not mention Flash specifically. One did mention the site's usability and the craftsmanship that was required to author the show.

- "It was one of those one-time watch things; it was put together amazingly though!"

Few open-ended answers to this question at UIC were different from the answers of Purdue and Notre Dame subjects. Many UIC subjects (14) would not visit the

site in the future because they felt they had learned its content. A couple of subjects told how the site's content could be expanded:

- "It should include sessions [on] using actual databases and how to maneuver and utilize them to their full potential…"

- "It only taught me how to use the AND feature. The AND feature is fairly simple to understand. I would have had more interest in learning about NOT."

A series of questions in the post-test questionnaire asked subjects whether they would recommend the multimedia web site to their friends and reasons why they would or would not make such a recommendation. We asked this question because we felt that subjects who would make such a recommendation would have found their experience using these interactive multimedia web sites valuable and worthwhile. Table 13 summarizes subjects' responses to the question "How likely are you to consult the ___ web site in the future?" The name of the multimedia show replaced the blank line at the three data-collection sites.

Table 13. Recommending these Multimedia Web Sites to a Friend

Rating	UIC		Purdue		Notre Dame	
	No.	%	No.	%	No.	%
Very likely	11	36.7	3	10.0	3	10.0
Somewhat likely	13	43.3	14	46.7	14	46.7
Somewhat unlikely	5	16.7	6	20.0	9	30.0
Very unlikely	1	3.3	7	23.3	3	10.0
Total	30	100.0	30	100.0	29	100.0

UIC subjects were most likely to tell their friends about the services offered. Most (21) said that the multimedia site taught information that would be valuable to their peers and a few (3) said that the site required only a short time commitment. Here is what UIC subjects said in their own words:

- "A lot of times, people type in sentences when searching for information. By learning this process, it could help them be more efficient with

searches."

- "In case they do not know how to start a research project other than typing in a phrase into a search engine."

- "If my friends are stuck on how to write their paper, I will take them to a computer and introduce them to the tutorial. By doing the tutorial, they will have a great lead on writing their paper."

- "Many of my friends do not know how to use AND."

Some remarks from UIC subjects referred indirectly to the interactive and/or multimedia character of this site:

- "It helped me learn to research better and I really liked the format, style, and helpfulness of the tutorial. It was fun to do."

- "I wouldn't have to tell them. They can learn for themselves in a fun and quick tutorial."

- "Research is prominent in the lives of my peers and it teaches you something and provides an exercise so you can actually perform what's been taught. It's friendly and simple."

- "The tutorial was helpful for those who don't know how to research and the games were enjoyable."

More than a half of the subjects at both Purdue and Notre Dame were likely to recommend the multimedia show to a friend. Typical comments from subjects at Purdue including the number of subjects making such comments (in parentheses) are:

- The site is easy to use and a good teaching tool. (8 at Purdue, 9 at Notre Dame)

- I would recommend it to friends who need to learn how to (read a scientific paper [6 at Purdue]) or (evaluate a web site [5 at Notre Dame]).

- The site is attractive, fun, and interactive. (4 at Purdue, 3 at Notre Dame)

- It is useful for individuals who don't yet know how to (read a scientific paper [4 at Purdue]) or (evaluate a web site [2 at Notre Dame]).

Other comments from subjects at Purdue were:

- "I have friends who are intimidated by scientific paper[s]."

- Sometimes my friends need to read scientific papers. The web site gives a quick and helpful overview that might make their research a lot easier."

- "It gives advice which is good but not intuitive such as skip the methods section at first."

- "Someone with not much knowledge on the topic of scientific papers and little time on their hands can easily learn a great deal from this web site."

Several comments were positive about the interactivity and multimedia elements featured in the "How to Read a Scientific Paper" site:

- "Technical papers can be scary initially but are much better for getting information. Plus it's a cool teaching technique. Fun looking."

- "It covers the information very well and it is more interactive than other sites."

- "Easy to use. Nice setup. Nice cosmetically. Very straightforward."

- "Some people need more interactive, hand-holding help [that] I am not patient enough to give them."

- "It was fun and very easy to operate, navigate."

Most remarks from Notre Dame subjects echoed frequently-occurring themes:

- "I don't know if my friends know the proper way to evaluate a web site."

- "Everyone should be aware of the consequence of using unreliable web sites. It is important to spread helpful information and teach proper web usage."

- "It contains information I never read before."

- "It gives you a lot of useful info on how to evaluate web site[s] and it

doesn't feel overly academic. It was fun to use. I would recommend it to my brothers in h[igh] s[chool] who might not already know about site evaluation."

- "It is something we need to be aware of in this age of Internet technology to be responsible people."

Typical reasons and the number of subjects (in parentheses) giving reasons for *not* recommending the multimedia shows to their friends were:

- My friends already know this information. (1 at UIC, 5 at Purdue, 9 at Notre Dame)

- The topic would not come up in our conversations. (2 at Purdue, 3 at Notre Dame)

- The site was not helpful to me. (2 at Purdue, 2 at Notre Dame)

- My friends don't do this [read scientific papers]. (2 at Purdue)

- It is too basic for the people I know. (4 at UIC, 1 at Purdue)

Individual remarks were as follows:

- "I'll probably forget about it [reading scientific papers] by tomorrow and none of my friends ever ask me."

- "The medium of the web site has a positive aspect of being really approachable. However, the information contained in it is really abbreviated… Things like looking something up in a scientific dictionary is narrow—there may be other sources that are better that people are more likely to use… I would say that the medium has a great deal of potential if implemented correctly."

Although some individuals would *not* recommend these web sites to their friends, in their responses they gave reasons why they *would* recommend the sites:

- "I think my friend[s] know much of what is on here because a lot of it is common sense. However, if they had a problem judging the credibility of a web site, I would definitely recommend it."

- "Most of my friends have already learned the hard way about Internet info or have figured this stuff out. There were a couple [of] really useful facts (updating sites, etc.) that I might just tell them about without sending them here. For freshm[en] just starting college assignments, I would [recommend the site to them]."

- "I don't think I would have reasons to tell my friends about the web site but if they were going [to do] research on evaluating web sites I would definitely recommend it."

- "Most of my friends have a firm grasp on finding appropriate research. If I had younger or more inexperienced friends, then I may recommend the tutorial."

- "My friends are generally as familiar as I am with [reading scientific papers]. I may, however, show it to less familiar people."

The final set of post-test questions queried subjects about the development of more multimedia web sites like the one they used in the experiment. Table 14 summarizes subjects' responses to the question "Would you like more web sites like the ___ web site?" The name of the multimedia show replaced the blank line at the three library sites.

Table 14. More Web Sites Wanted?

Rating	UIC		Purdue		Notre Dame	
	No.	%	No.	%	No.	%
Yes	25	83.3	15	50.0	16	53.3
No	1	3.3	7	23.3	5	16.7
Don't know	4	13.3	8	26.7	9	30.0
Total	30	100.0	30	100.0	30	100.0

A whopping 83.3% of UIC subjects wanted more multimedia shows like the one they used in the experiment—only one UIC subject did not want more shows. Although the enthusiasm amongst Purdue and Notre Dame subjects was somewhat less emphatic, about half wanted more multimedia web sites. Subjects suggested a wide range of topics. Here are suggestions for library-use topics from

UIC subjects and the number of subjects making the suggestion (in parentheses):

- Citing sources in term papers (5)

- Online searching skills, e.g., using OR, using NOT, beyond the basics (4)

- Finding library materials, e.g., finding books and journals in the library, using the library classification, finding journal articles online (4)

- Internet and technology-related tasks, e.g., using technology, the Internet, and computers (3)

- Using databases, e.g., online sources for newspapers, charts, data, government information (2)

- Doing research for writing papers including doing research on the Internet (3)

- Evaluating web sites (2)

- Writing the paper (2)

- Plagiarism (1)

- How to study more effectively (1)

One UIC subject summed up his suggestions with the statement "Anything you can get, [the multimedia show] is a good tool."

At Purdue, the range of topics was much more targeted on doing research. Here are Purdue subjects' suggestions:

- How to write a paper, a scientific or research paper, a lab report, a memorandum, a resume (4)

- Finding library materials, e.g., how to find scientific papers, how to search for material in the library (3)

- How to use statistics software (2)

- How to analyze qualitative data (1)

- Citing sources in term papers (1)

Notre Dame subjects were interested in learning more about evaluating web information and wanted more multimedia shows on conducting research generally. Here are their suggestions for more shows with library-use content:

- Using web information, e.g., where to look for trustworthy web sites for research, the dangers of improper web usage, the consequences of being ill trained on how to use the web safely and effectively, how web sites have information to harm you, maybe evaluating web information based on one's major (5)

- Online searching skills, e.g., using the library catalog, doing research online, how to use search engines more effectively, which search engines to use to research specific topics, how to use the library's web pages (4)

- Finding library materials, e.g., articles in scholarly journals, how to find books in the library (2)

- [Web shows] are helpful and could be used for any topic (2)

- How to use electronic journal articles (1)

- Citing online information (1)

- Plagiarism (1)

At all data-collection sites, subjects made suggestions went beyond content that an academic library would provide for students. Examples are:

- How to use various programs in a computer cluster

- How to get involved [at the university]

- How to find jobs

- How to learn a language

- How to choose a major

- Any topic

4.6   Does Prior Familiarity Influence Learning?

The data and analyses described in section 4.3 demonstrate that interactive multimedia web sites built under the guidance of library educators were effective teaching tools because users' topic knowledge was greater after visiting the sites than before. The researchers investigated several variables as potential predictors and consequences of this learning. Although no results were statistically significant, this section describes the analysis in detail and suggests potential implications of the results.

4.6.1   Prior familiarity and learning

The researchers hypothesized that students who were more familiar with the topic of the web site would have less to gain from using the site, and therefore, would have lower learning scores. The data, however, did not support this hypothesis, as the results were not significant across the three data-collection sites. One possible interpretation of this result is that students are not particularly skilled at assessing prior topic knowledge. That is, students may not be aware of gaps in their understanding of library resources and services. In practice, the results suggest that librarians should not be discouraged from creating instructional materials for topics they consider important on the basis of students' self-reported topic familiarity. Instead, other means of evaluating students' skills should be employed.

4.6.2   Learning, knowledge and student self-perceptions

The researchers anticipated that students' experience of the site would influence their perceptions of their own capabilities. Specifically, we hypothesized that (1) the more a student learned, the more confident he or she would feel about their future performance of the task and (2) the more knowledgeable the student was upon completing the instructional module, the less difficulty he or she would anticipate when completing similar tasks in the future. Again, the results were not significant at all data-collection sites. Again, failure to achieve significant results may indicate students' inability to assess their knowledge of a particularly topic. If increased confidence and reduced anxiety are desired outcomes,

librarians may want to find explicit ways to acknowledge changes in students' skills and learning following an instructional activity.

4.6.3 Learning and site assessment

Finally, the researchers hypothesized that the more a student learned from the site, the more useful he or she would perceive the site to be. That is, we expected students' appraisal of utility to derive in large part from their learning. Yet again, the data did not support this hypothesis. As mentioned earlier, this could be a result of students' inability to accurately assess the change in their topic knowledge. Perhaps they do not recognize what they have learned from using the site. Alternately, students might not value the knowledge that they accrued. Our data did not allow us to discriminate between these possibilities. In practice, this suggests that when assessing the effectiveness of library instructional tools such as the ones evaluated in this project, it is important to consider student learning and perceptions of utility separately.

4.7 Predicting Revisitation and Recommendations Based on Subjects' Perceptions Using the Multimedia Sites

As discussed in section 4.5, the majority of this study's subjects were unlikely to return to the multimedia shows. This section describes an exploratory analysis of the factors explaining this outcome. Recognizing that this analysis was not theoretically driven, we opted to employ a statistical technique known as stepwise multiple regression, a technique not generally used for hypothesis testing. We interpret our results accordingly.

In stepwise multiple regression, all independent variables are evaluated, and those meeting a specific statistical threshold are added to the model. As a result, only predictors that significantly improve the model's predictive power, the model's R^2, are included. The selection of variables is not theoretically informed.

Our first hypothesis was that students' perception of the multimedia shows, show content, and students' knowledge of content might influence the likelihood that they would revisit it in the future. The results of this analysis were somewhat

difficult to interpret, a likely byproduct of the exploratory statistical methods employed (Tables 15 and 16).

Table 15. Predictive Power of the Model

Institution	Adjusted R^2
UIC	.69
Purdue	.33
Notre Dame	.39

Running the regression, we found several significant factors across the three data-collection sites, but their direction of influence varied. On one hand, UIC students were more likely to say they would return if they found the site to be useful and if it helped them feel more confident about their abilities. On the other hand, UIC students were less likely to return the more familiar they were with the topic prior to using the site.

Table 16. Coefficients from the Regression Model
Predicting a Planned Revisit

Institution	Factors	β	SE	t	Sig.
UIC	Familiarity	.140	.047	2.944	p<.01
	Usefulness	-.258	.079	-3.284	p<.01
	Change in confidence	-.160	.048	-1.508	p<.05
Purdue	Uniqueness	.157	.060	2.593	p < .05
Notre Dame	Usefulness	-.260	.076	-3.422	p < .01
	Uniqueness	-.217	.074	-2.936	p < .01

Note: A negative coefficient indicates an increasing likelihood of revisiting.

At Purdue, the only significant predictor of a subject's planned return was how similar the site was to other academic web sites. At Notre Dame, two factors predicted whether a subject planned to return: (1) the more *dissimilar* the multimedia show was from other academic sites and (2) the more useful they considered the site to be. The explanatory power of the models for UIC and Purdue was limited, explaining between 30% and 40% of the variation of the

66

dependent variable. Though the UIC model does have a fairly large R^2 at .69, the model is still exploratory in nature.

Our second hypothesis was that students' perceptions of the site would also influence their likelihood of recommending the site to their peers. Again, there was considerable variation among the sites in this analysis (Tables 17 and 18). Amongst UIC students, planning to recommend the site was associated with the perception that the site had been useful. The more useful and the more unlike other academic sites a Notre Dame subject considered the site, the more likely that he or she would recommend it to others. Though also influenced by the usefulness of the site, difference from other academic sites was *not* a significant predictor for Purdue students; instead, the second factor influencing these students' likelihood of recommending the site was *how enjoyable they perceived the site to be.* These models explained between 20% and 50% of the variation at the sites.

Table 17. Predictive Power of the Model

Institution	Adjusted R^2
UIC	.17
Purdue	.48
Notre Dame	.33

Table 18. Coefficients from the Regression Model
Predicting a Planned Recommendation

Institution	Factors	β	SE	t	Sig.
UIC	Usefulness	-.244	.105	-2.316	p<.05
Purdue	Usefulness	-.185	.064	-2.869	p < .01
	Enjoyment	-.219	.063	-3.464	p < .01
Notre Dame	Usefulness	-.157	.074	-2.088	p < .05
	Uniqueness	-.142	.060	-2.359	p < .05

Note: A negative coefficient indicates an increasing likelihood of recommending to others.

The Notre Dame revisiting model makes the most sense. The factors that would

make Notre Dame subjects revisit the show was its dissimilarity from other academic web sites and its usefulness. The Notre Dame multimedia show was different from other academic web sites because it was conceived to be an interactive multimedia show. Although the UIC show was more interactive in nature, the Notre Dame show had a fair amount of animation, graphics, and interactivity for navigation. Future studies might systematically evaluate the significance of perceived usefulness, uniqueness, and enjoyability on the likelihood of revisiting and recommending. Researchers could also evaluate behaviors and attitudes, assessing whether students do actually revisit or recommend the sites.

5 Learning How to Keep Current in One's Field

5.1 Methods Used in Interviews

One participating library educator (Sandy De Groote at UIC) conducted personal interviews with medical school graduate students and faculty to learn how they keep current in their field. The personal-interview method was chosen over the before-after studies that other library educators conducted for three reasons. First, advanced researchers—faculty, graduate students, residents, etc.—are much more likely than undergraduate students to have a need to keep current in their field; however, the number of advanced researchers is so much smaller than the number of undergraduate students that both the PI and Ms. De Groote felt that it would be difficult recruiting a sufficient number of respondents for such a study. Second, interviewing would be less intimidating to advanced researchers than requiring them to take pretests and post-tests about their knowledge of a particular library service. Third, Ms. De Groote's show demonstrated the process of signing up for current-alert services. It would be difficult to test respondents about their knowledge of this process in pretests because the multimedia show would be some respondents' first exposure to current-alert services.

Ms. De Groote recruited prospective respondents by posting flyers at various medical-school campus locations and sending email messages to select UIC listservs that promoted the availability of the tutorial and requested interested individuals to participate in the study. Ms. De Groote made appointments with prospective respondents and instructed them to meet at her library office at a convenient time. Eligible respondents were selected on a first come, first served

basis. Before the interview began, respondents read and signed a consent form. Also, the consent form gave permission to the interviewer to make audiotape recordings during interviews.

When interviewing respondents, Ms. De Groote used the questionnaire as the script for the interview. She read questions to interviewees and wrote their answers on the questionnaire. She also audiotaped interviews because of the difficulty of writing everything interviewees said on paper.

The questionnaire had four parts: (1) part 1 featured two questions that collected demographic information on respondents, (2) part 2 consisted of nine open- and closed-ended questions that asked respondents about how they kept current in the field and included follow-up questions that depended on respondents' answers to lead-in questions, (3) part 3 listed six questions that asked respondents to rate the multimedia show on several aspects, and (4) part 4 was a series of closed- and open-ended questions that asked respondents about their likelihood of visiting the multimedia show in the future. The questions in parts 3 and 4 of Ms. De Groote's questionnaire were the same as parts 2 and 3 in the post-test questionnaires for the before-after studies (see section 4.1). Into Appendix H is inserted the questionnaire that was used for interviews at UIC. Participation in the interviews was completely voluntary. Respondents were paid $20 for their involvement even if they skipped questions or withdrew prematurely from the study. Audiotapes of interviews were transcribed prior to the PI's analysis of interviews.

5.2 Searching Online Databases

Of the 15 people who took part in interviews, ten were graduate students, two were faculty, two were librarians, and one was a fellow (a position above a resident). The first question that interviewees answered addressed how they kept current in their areas of research, teaching, and practice. Table 19 lists their responses. Most respondents cited several approaches to keeping current.

Table 19. How Respondents Keep Current

Approaches to Keeping Current	No.
Searching online databases	14
Reading and browsing current journals	9
Attending professional conferences	2
Consulting an academic advisor	2
Talking to fellow colleagues	2
Subscribing to current-alert services	2
Subscribing to listservs	1
Monitoring blog lines	1
Reading tables of contents of journals online	1
Reading a professional society's web page	1
Doing searches for a faculty member	1
Consulting lab notes	1

All but one respondent said that searching online databases kept them current. Over half read and browsed current journals. Some subscribed directly to journals or received them in paper and/or electronic form due to their membership in a professional society. Others browsed current journals in the library or they consulted them online through the UIC Library gateway. Only two of the 15 interviewed respondents subscribed to current-alert services that sent them updates on a regular basis.

The interviewer asked respondents to describe the impetus for their online searches of medical databases. Although interviewees gave multiple responses, most cited a single event that prompted their database searches. Table 20 summarizes their responses.

Interviewees put the results of their online searches to work in the production of class projects, assignments, papers, dissertation research, teaching, and seminar participation. When asked who searched for them, everyone said that they did their own searching. One or two remarked that they would ask a librarian for help or would like to delegate searching to a librarian. Some graduate students

did searches for their faculty advisors.

Table 20. Impetus for Searching Online Medical Databases

Impetus	No.
Class projects, assignments, and papers	5
To keep current	4
To help faculty find current information for their research, teaching, practice, etc.	4
To support research	4
To support one's own dissertation research	2
To prepare for teaching	1
To prepare for participation in seminars	1

When asked which search engines and databases they searched, respondents cited the following:

- Medline (7 respondents)

- Ovid (7 respondents)

- PsycInfo (7 respondents)

- Cinahl (6 respondents)

- PubMed (6 respondents)

- Web of Science (3 respondents)

- Others (1 respondent each): Cochrane, Ebscohost, Library Literature, Mbirds, MD Consult, OCLC, ScienceDirect, SciFinders Scholar

5.3 Learning About Current-Alert Services

Except for one librarian, all respondents were likely or very likely to conduct multiple searches on the *exact same* topic or idea over a set period of time. Such responses are a strong indication that this study's interviewees could benefit from subscribing to the current-alert services that the "Keeping Current" multimedia show promoted. Prior to interviews, Ms. De Groote asked prospective interviewees to use her show. Two respondents visited the show a week or more

before the interview and the rest visited the show on the same day, the day before, or a few days before the interview. Interviewees visited the show once (3 respondents), twice (7 respondents), or three or more times (5 respondents).

When asked about the effectiveness of the "Keeping Current" show at achieving its objectives of demonstrating how and telling why to sign up for current alerts on Medline, all but two respondents said that the show was "very effective" or "somewhat effective." Respondents in both camps, that is those who said the show was effective and those who said it was ineffective, told why they experienced some difficulty with the show. Some comments cited technical problems such as loading Flash on their web browsers and other comments cited content problems such as defining concepts and eliminating online searching jargon.

Seven of the 15 respondents subscribed to Medline's current-alert service as a result of using the "Keeping Current" multimedia show. As for the remaining eight respondents, four said they would be "very likely" to subscribe and three said they would be "somewhat likely" to subscribe to Medline's current-alert service as a result of using the "Keeping Current" multimedia show. Only one respondent expressed uncertainty about signing up for current-alert services now or in the future. This respondent was a librarian who typically did searches for UIC faculty and for his or her own research.

Six respondents mentioned other current-alert services to which they had already subscribed. Some services delivered tables of contents for journals of interest and others delivered recently-published journal articles based on user profiles. When the interviewer asked the other interviewees why they had yet not signed up current-alert services, most gave reasons that underlined their inexperience with or lack of knowledge about current-alert services. Here are their comments:

- "[I am] just getting into the field as a first-year graduate student."

- "I don't know. I'm just getting into this so this is all new to me."

- "I don't know how to sign up."

- "I didn't have a reason to do it."

- "I didn't know if there are others."

- "The whole idea was new to me and I didn't know it existed until now."

Other respondents had different reasons for not signing up:

- "I learned how to save a search in automatic Medline before but I don't know if it sends an automatic alert about this to me."

- "It is so easy to go to PubMed and just search for the topic I need. In the future, when I become more professional, I may need to use it."

- "Mostly it is taking the time to do it and making the investment and also knowing how to do it."

The interviewer asked respondents what was the most important information they learned from the "Keeping Current" multimedia show. Most responded with a statement that summed up the show's objectives of demonstrating how and telling why to sign up for a current-alert service. This is reassuring because it demonstrates that the multimedia show was successful in achieving its objectives. Here are examples of what users said:

- "That you can customize information that is needed and it will do the search for you instead of looking it up every time."

- "I think that it told me not to do the same search again and again. This was the most important information I got from the tutorial."

- "I can put in my search queries and have [the service] send things back to me."

- "I learned how to save searches and how to receive automatic updates on my subject of interest."

- "How to keep updated. Then you don't have to do search every time with keywords."

- "How to set up auto alerts … [the] practicality of it and specifics and differences in different systems."

The interviewer also asked respondents to say a few words about something new that they learned from the "Keeping Current" show. In addition to summary statements like the ones above about saving searches, respondents mentioned various features of current-alert services. Examples are:

- "The Table of Contents thing. I kind of knew it but the tutorial reinforced it."

- "[I] learned about deleting searches."

- "The PubMed version allows you to email the results to yourself."

- "Specific differences between databases and how to set up [the service]."

- "I learned about auto alert service. Now I don't have to search everyday because I can get email alerts."

5.4 Using the "Keeping Current" Multimedia Show

Interviewees answered the same questions about rating their experience using interactive multimedia shows as subjects answered in before-after studies (section 4.4). The questions, 0–10 scale, and multiple-choice answers were the same in both interviews and before-after studies.

Figure 34 summarizes interviewees' responses to the question "On a scale of 0 (not familiar) to 10 (very familiar), please rate how familiar you were with the information presented in the "Keeping Current in Your Field" web site." Interviewees could also choose the response category for "No Opinion.

Unlike the before-after studies in which subjects' familiarity averaged between 6.0 and 7.0, interview subjects' familiarity with current-alert services was much lower at an average 4.5. Just about half of UIC interviewees rated their familiarity from 0 to 4.
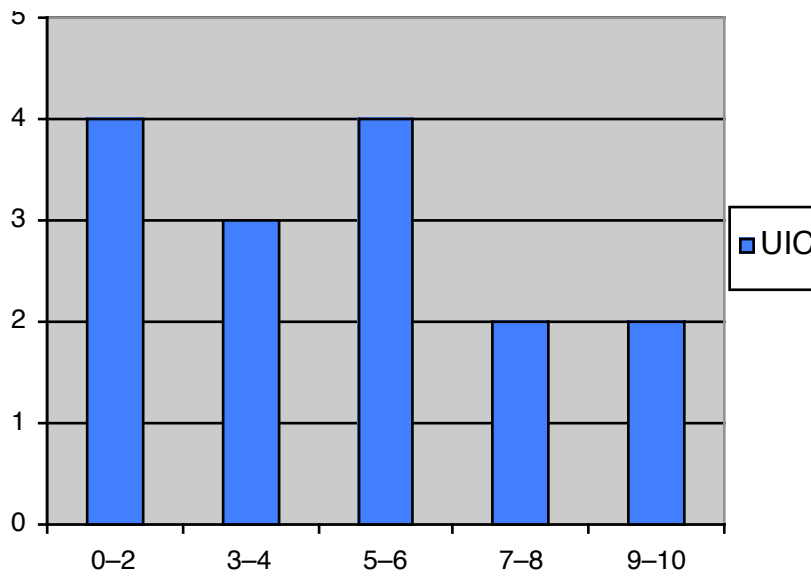
Figure 34. Interview respondents' ratings for
familiarity with tutorial content
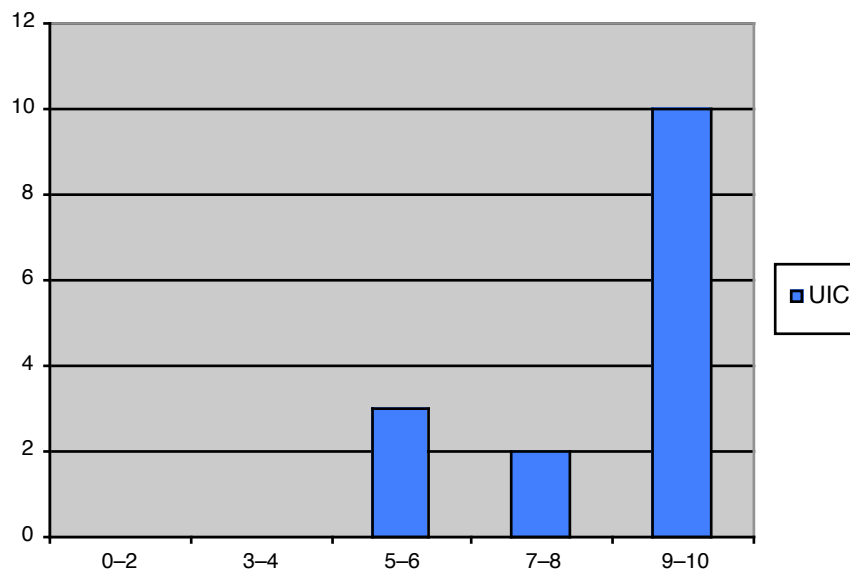
Figure 35. Interview respondents' ratings for the
usefulness of tutorial content

Figure 35 summarizes interviewees' responses to the question "On a scale of 0 (not useful) to 10 (very useful), please rate how useful the information presented in the "Keeping Current" web site was to you." Again, respondents could choose the response category "No Opinion."

Interviewees were especially enthusiastic in terms of rating the usefulness of

multimedia-show content. Two-thirds gave it the highest (10) or next to highest (9) rating, and the mean rating was 8.5. UIC subjects were also enthusiastic about the "Doing Research" multimedia show, averaging 8.1 in their usefulness ratings. Subjects at Purdue and Notre Dame were cooler about usefulness but they were still positive, averaging 6.6 and 7.5, respectively.

When asked to rate the character of the "Keeping Current" show vis-à-vis other web sites that addressed academic matters, UIC interviewees averaged 5.9. About half gave ratings from 0 to 6 and half from 7 to 10. These ratings were a half to almost one and a half points lower than the ratings that subjects who participated in before-after studies at UIC, Purdue, and Notre Dame gave to their multimedia shows (figure 30 and section 4.4). One interviewee's comment may shed light on the reason for such a low response.

- "I'm having difficulty with the instructions. You have got a lot of information in a little bit of space. I was tired of reading before I got to what I really needed to know… There was a lot of stuff going on. For a new person, [there was] too much information."

Since the "Keeping Current" web site was demonstrating how to sign on and profile oneself for current-alert services, the developer made every attempt to remain faithful to the look-and-feel of the actual signon procedure. Adding instructions to screens that were already chock full of text increased the amount of displayed information. Developers of multimedia shows that show step-by-step instructions should give careful thought to reducing their shows' complexity by reducing the amount of words displayed on the screen, e.g., replacing instructions with voiceovers, summarizing instructions with bulleted points, and showing closeups that show the essentials and eliminate extraneous details.

Like their counterparts in the before-after studies, interview respondents did not feel they would have difficulty doing alert-service signup tasks in the future. Only three interviewees rated this task at a medium-level of difficulty (ratings 4, 5, or 6). The rest rated it not difficult (ratings under 4). Visiting the "Keeping Current" multimedia was not an especially enjoyable task. Interviewees averaged

6.0 on their ratings about enjoyment. This average rating was in between the 5.6 rating that Purdue subjects and 6.8 that Notre Dame subjects gave to the multimedia shows at their institutions in the before-after studies (figure 32 and section 4.4). The high average rating of 8.1 that UIC subjects gave to the "Doing Research" multimedia show may have been due to the large dollop of interactivity that was featured in this show. Despite their academic content, interactivity may be the key to high enjoyment ratings for these multimedia shows.
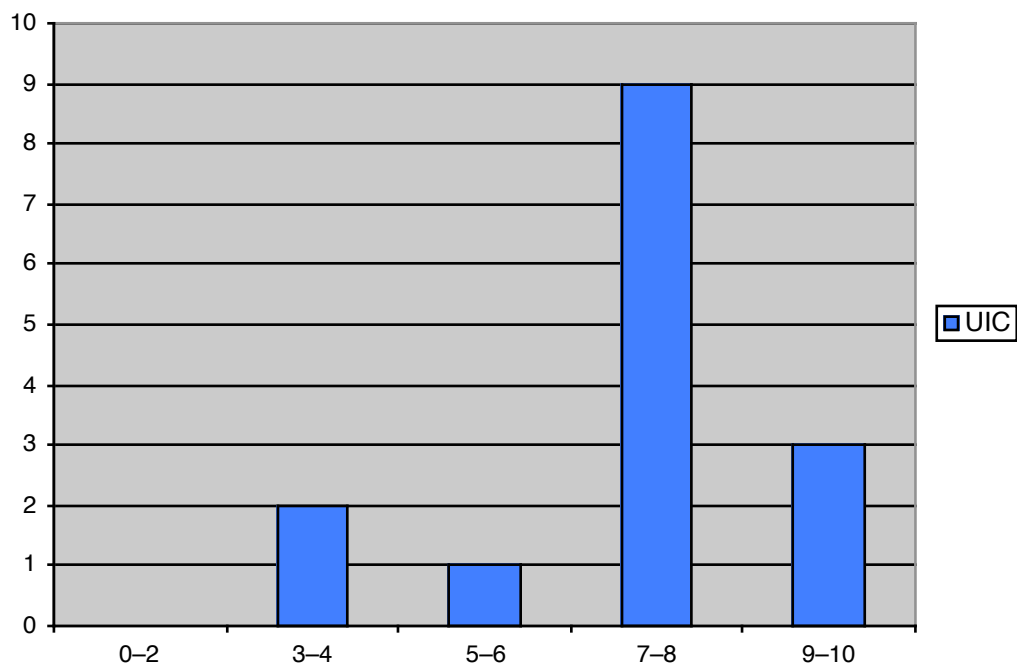
Figure 36. Interview respondents' ratings
for a change in confidence

Figure 36 summarizes UIC interviewees' responses to the question "On a scale of 0 (no change in my confidence) to 10 (A great deal of change in my confidence), please rate the amount of change in your confidence in your ability to subscribe to and profile your interests in a web site for current-alert services." Once again, respondents could choose the "No Opinion" response category.

The average rating of 7.4 was one to three points higher than the average ratings that the ratings of subjects who participated in the before-after studies. Perhaps

the actions of signing up and profiling for current-alert services were so much more concrete and objective than the subjects of the other multimedia shows, i.e., evaluating web sites, reading a scientific paper, or analyzing a search topic, that interview respondents were less constrained than subjects in before-after studies to give higher rankings.

5.5 Interviewees' Future Use of the "Keeping Current" Multimedia Show

In the final set of questions, the interviewer asked interviewees about their future use of the "Keeping Current" multimedia show. This set was the same as the final set of questions in post-test questionnaires (see section 4.5). In response to the question "How likely are you to consult the "Keeping Current" web site in the future?," 60% of interviewees said that they were "very likely" (3 people) or "somewhat likely" (6 people) to consult the site. In the before-after studies, the majority was unlikely to revisit the show. Perhaps, the face-to-face nature of interviews made people more likely to respond positively to this question because they did not want to offend the interviewer whom they might have felt was responsible for the site's design and development.

The reasons why interviewees were likely to revisit are some of the same ones that were mentioned in before-after studies such as to refresh one's memory or to learn something new. Here is what interviewees said about the "Keeping Current" multimedia show in their own words:

- "To save time. It is fine to go back and do something regularly."

- "When I have the need to subscribe to different databases."

- "To show other people."

- "To learn something new from the tutorial."

- "To refresh my memory about how to do this stuff again."

Since the nature of signup and profiling was procedural, some respondents said that they would revisit the site when they were ready to sign up for current alert service.

- "If I have questions later."

- "When I go to set up my auto alert."

- "Because there was a lot of information there that was helpful. Initially when I went there, it was like I've never seen anything like this before. Now that I've kind of been searching and doing some things [online], I think it will be useful if I go back and look at it again."

- "To consult specific information that is laid out in the tutorial."

Most interviewees who would not revisit the "Keeping Current" show in the future felt that a single visit was sufficient to learn about current-alert services including how to sign up and profile oneself. Here is what they had to say:

- "Because I signed up for most of the current contents and I would just go directly to their web pages for information. Or to the library web page."

- "Being a librarian, I have a head start on how it works so once you learn it you know how to navigate around."

- "Once I know the process of how to initialize the search, then I believe I understand the process. My only question is, how to be recognized as a subscriber."

- "Because it is not to difficult …The first time is enough."

- "Because it's not complicated."

- "Very easy and not necessary to go back."

All 15 interviewees were likely to recommend the "Keeping Current" show to their friends. Such unbridled support for multimedia shows was not evident amongst subjects in before-after studies. Again, we attribute the positive support to the face-to-face nature of the interviews where it might have been difficult to tell the interviewer something negative about the show. Yet, because the idea of current-alert services was new to several interviewees, they thought their peers could benefit from knowing about these services. Here is what they said in that regard:

- "Not many people know about this right now and they may be very interested."

- "I think for the new grad[uate] students to let them know the service is out there."

- "I think it's a good place for beginners to start. It sums up what it is and how you can sign up for different services."

Others remarked that the multimedia show was an easy and convenient way to learn about this topic.

- "Because it's easy to use and it will tell you how to do the search very clearly. Because it has Flash it is easy to follow."

- "Other faculty [should visit the show]. It is brief and to the point and really walks you through step by step."

- "Simple, quick, easy way to learn how to save searches, and to receive the updates."

- "It's easy to follow and I don't have to show them myself or refer to the library since it's online."

- "Very easy and convenient."

Finally, interviewees liked the idea of current-alert services and their remarks echoed their positive reaction to these services.

- "I think it will save [my friends] time and help them keep current."

- "To receive update email about current research is very good."

- "Because it is important to catch up on articles or knowledge that they will get from keeping with the tutorial."

Eleven of the 15 interviewees made one or more suggestions for topics that new multimedia shows could address. Ten of these 11 wanted to learn more about online searching generally or about searching specific databases such as Ovid, PubMed, Refworks, and Science Direct. Other suggestions were:

- Recent conferences in my area of interest

- People in my area of interest, what they are doing, interesting things.

- How to cite which articles cite other articles.

- About the electronic journals to which the library subscribes.

5.6 Summary of Findings

Most interview respondents were unfamiliar with current-alert services. As a result of learning about these services, they were genuinely interested in trying them out and almost half of those interviewed signed up shortly after using the "Keeping Current" multimedia site. They gave high ratings to the site's content and their confidence about subscribing to and profiling their interests in a current-alert service after using the "Keeping Current" site. Some would return to the "Keeping Current" site to refresh their memory about subscribing and profiling. All interviewees were likely to recommend the "Keeping Current" show to their friends because they felt that their friends were also not aware of current-alert services and could benefit from learning about them.

6 The Role of Library Educators in Multimedia Production

6.1 Achieving this Project's Fourth Objective

This report's final section addresses this project's fourth and final objective:

- Plan for workshops, demonstrations, and immersion programs at which library educators trained in interactive multimedia production can pass their knowledge and skills onto interested staff and colleagues

When the project started on October 1, 2001, 17 library educators (four to five educators per institution) were on board. This project's principal investigator was confident that most of the 17 educators would be major players in making the fourth and final objective a reality. But things did not turn out as planned. When the project ended on September 30, 2004, only eight library educators were active participants on the project. Three educators dropped out because they took jobs at other institutions. Others dropped out for reasons that pertain to learning and doing multimedia production. This section examines these reasons in greater detail because both reasons and this project's final objective were concerned with library educators passing their knowledge of multimedia production onto interested colleagues.

Additionally, the PI planned for library educators to do production work entirely on their own. Only three (De Groote, Fosmire, and Yu) library educators did the majority of the development on their own and two of the three (De Groote and Yu) consulted one of the project staff developers to assist them with programming difficulties or design work. The remaining library educators relied almost entirely on support from a fulltime developer paid through LUMENS Project funds (Kinkus), external grant funds (Georgas and Armstrong, or a

combination of library funds and LUMENS Project funds (Fuderer, Sharp, Smith, and Warner). Now that all work effort connected with the project is done, the PI recognizes that achieving this project's final objective would be difficult because this project did not produce a corps of library educators trained in interactive multimedia production to pass their knowledge and skills onto interested staff and colleagues.

Despite problems with teaching, learning, and doing multimedia production, the library educators who stuck with the project and evaluated the multimedia shows that they developed for this project learned that their hard work was worth the effort. Experimental findings were positive and significant—interactive multimedia web sites were effective teaching tools because users' topic knowledge was greater after visiting the sites than before. Also, library users were grateful to learn about new library resources and services that would make their job as teachers, researchers, and students a little easier and their confidence in their ability to use these new resources and services was quite high.

Although this project demonstrated that interactive multimedia sites were effective teaching tools, it did not enlist the most effective approach to teaching library educators about multimedia production nor did it arrive at effective approaches to multimedia web-site production. To determine more effective teaching approaches and identify the role of library educators in the production process, the PI queried participating library educators about their experiences in the project. She collected information through email messages, a listserv discussion, phone calls, and face-to-face personal and group interviews. The subsections that follow summarize findings in this regard.

6.2 The Difficulty of Learning Macromedia Flash

Most library educators agreed that Macromedia Flash was a difficult program to learn and master. During this project's training phase, the PI would teach educators something new about Flash in distance-education broadcasts and then educators would need time to review and experiment on their own. They found themselves having to relearn what they had learned when weekends, holidays,

and the other demands of their jobs intervened. One Notre Dame educator said "I think that none of us expected Flash to be as complicated as it was. Trying to learn this software in 2- or 3-hour stretches (or as our schedules permitted) did not work very well for us." Another Notre Dame educator added that "Our daily routine didn't allow us to keep up with Flash."

Some participants felt that library educators who had prior experience with comparable computer programs were able to build on their expert knowledge to learn Flash and needed less time to become proficient at the program. They added that it may be a good idea for participants in follow-up projects to have some prior knowledge of similar software because "learning from scratch was tough for all of us." A library educator at UIC confessed that "I don't have a technology background, my library education didn't include it. It takes a lot of time and [mastery of] more than one program [to do multimedia production]."

The Notre Dame group had several technical difficulties that prevented them from keeping up with the rest of the participants. At the beginning of the project, their computers were using Windows NT which prevented them from working with sound files and created problems in other areas too. They advised that future projects of this type should present participants with a list of technical requirements so prospective participants can know whether or not all of the software will work at their institutions and take steps to get the technology up and working before the project starts.

Some participants felt that they did not get a full understanding of the project before they were chosen. Had they had a better understanding of what was necessary to learn Flash, develop a multimedia show, and evaluate the show would have kept them from taking on other projects. One library educator put it in a different way. She said, "I missed the big picture. I needed to see the big picture to be motivated. I would have picked a different tutorial. It wasn't just about learning Flash, it was developing an actual tutorial." Others at her institution disagreed with her saying that they understood the big picture because their supervisor explained it to them. Instead, they reiterated how hard it was to

learn and use Flash for web-site development and added that "there is a misperception that all this [multimedia production] is easier to develop than it really is." They made the following observation:

- "Despite the huge push in libraries to increasingly move toward online instruction, the one thing that's not acknowledged is just HOW MUCH TIME is involved in developing online tutorials. We create them in order to save time in the classroom, but developing them, in my opinion, is incredibly time-consuming. We don't have a team of in-house programmers-developers in our library. Everything that we develop, we do it ourselves (or hire a consultant if we are lucky enough to have grant money)."

One library educator at UIC summed up her frustration with Flash with the following remark:

- "I got so intimidated by learning Flash. Too many other things going on to learn Flash. It wasn't that I didn't want to learn it. Knowing what I know now, I don't know if I'd want to spend my time doing the actual development. Other things turn me on. I like coming up with the idea, the vision, but not the development. Realistically, in terms of development, someone else can do it."

This educator made a good case for handing development work to a separate development staff. Her involvement in multimedia production would be focused on the idea and the overall vision of the project. Her ideas about multimedia production were shared by a UIC colleague:

- "This [multimedia production] isn't beyond our intellectual capability. But with other responsibilities, and time constraints, one person just can't do the project from beginning to end. There was a ridiculous amount of time involved. Especially since we came at it not knowing what was involved with development. Now I'd know and I'd hire someone."

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6.3   Support from Library Administration

The library educators at the four participating libraries would agree that a successful multimedia project requires the support of the library administration especially in terms of giving high priority to multimedia activities and holding off on assigning staff new responsibilities while the multimedia project was ongoing. Some library educators were particularly pessimistic about this issue:

- "Our library administrators do not think in terms of time. We are charged with new projects that take time and effort on top of everything we are already doing. If administrators charge us with new projects, we must be able to drop something else we are doing."

Several library educators asserted that the project team should have been more forthcoming about the amount of time required for all aspects of the project—learning Flash, doing development work, and conducting the evaluation. Here are their comments:

- "Had we known how much time was required to learn Flash and do multimedia production, we could have discussed our needs with library administrators, and, perhaps, received more support from them at least in terms of a moratorium on the assignment of new projects."

- "Our library administrators asked or invited us to do this and no one understood how time consuming it would be."

- "A better idea of how many hours a week to do this project. I would have made more of an effort to redistribute my responsibilities. An idea of how many hours could have given the administration an idea of how much time we needed and that we needed free time from new tasks."

At UIC, Library Director Sharon Hogan was this project's champion. Unfortunately, shortly after the project began, Sharon became gravely ill, resigned her administrative duties, and passed away shortly after. The principal investigator was not successful in terms of finding a comparable champion for the project amongst her successors. At another library, the administration supported

the project by "borrowing" a regular Flash developer from another department but the support did not go so far as to free library educators from a portion of their regular duties. These educators remarked that "Fitting Flash into already tight schedules did not work."

Library educators at another institution described the situation in which they found themselves and made suggestions about how to avoid this situation in the future:

- "I think it would have helped immensely if this had been a project that our library itself encouraged and supported. Instead, I think this was viewed as 'something that ___ were working on' rather than something that the library (reference department, administration) acknowledged as important to our teaching. So, as a result, we had to squeeze this project into an already packed schedule. Not enough time and ever increasing responsibilities were HUGE factors in us not getting this done sooner. So maybe, in the future, if this could be a project where you get real buy-in from directors, department heads, this might help."

Support from the library administration is a key factor that makes for a successful multimedia project. Such support could come in the form of providing staff for development work and usability testing, obtaining release time for project participants so they can devote their time and effort to the multimedia project, and giving high priority to the multimedia project.

6.4 Flash and Other Multimedia Programs

Despite the time-consuming nature of Flash production, some library educators came to like Flash. Here is what two UIC educators said:

- "I really like what we could do with Flash. It is more interactive than what other [programs] can do. It is colorful, animated, interactive, and [users can] move at their own pace. That's not true of other tutorials."

- "I really like Flash. It can be very interactive and the user can watch. If I were to do more, I'd have to learn more about Flash. I only know the

basics. My tutorial was very linear. I would have chosen a different project. I would like to use it again but I'd have to learn more."

Some educators confessed that their project did not use a lot of interactivity, it was primarily text-based, and they could have put the same content into a text-based page. An unexpected outcome of this project was that the experience of learning and developing with Flash made library educators more likely to experiment with comparable programs. MovieMaker and Viewlet are two programs that library educators learned during the course of the project and they felt that these programs had promise for accomplishing certain aspects of multimedia production.

6.5 Teaching Multimedia Production to Practitioners in the Future

The principal investigator used distance-education technologies almost exclusively to teach library educators about multimedia production. Library educators used their web browsers to join a Webex web-based video broadcast and their telephones to join a conference call for audio reception. Using conference calls for audio made it possible for anyone to talk during broadcasts to ask questions, give positive or negative reinforcement, and share a laugh about an ongoing thread. Library educators at the four participating institutions gathered in a conference room or lab at their institution where they projected video image onto a large screen or white wall so that everyone assembled could view it. If the PI wanted educators to try a particular Flash technique that she was demonstrating, the educators launched Flash on their PCs and did the technique on their own. If they had problems, their nearby colleagues stopped what they were doing to help them.

About two months after weekly Webex broadcasts began, all participants gathered in Ann Arbor for a two-day meeting to learn about the methodology for planning multimedia productions, survey compelling features of related media that may be applied to educators' ideas for a multimedia program, and learn about outcome-based evaluation (OBE). The PI made two or three site visits to

participating libraries later in the project but the two-day meeting in March 2002 was the only time that all project participants were gathered in one place at the same time.

In late summer 2002, the PI was forced to switch from Webex to Centra for weekly broadcasts because her School's technology unit was consolidating distance-education activities into Centra. Despite the unit's claims about the advantages of Centra, LUMENS Project participants preferred Webex over Centra because of its real-time audio capability. With Centra, participants could hear audio from only one participant at a time. To ask questions, participants had to electronically "raise their hands," the instructor had to notice their "upraised hands," then hand over the audio channel to them. Participants voiced disapproval with Centra:

- "The [Centra] distance-education program was so difficult. Lots of silence and only us Notre Damers commenting. ___ was tempted to do her email when she worked alone as opposed to the Webex conference phone call."

- "We also wanted to note that we very much preferred the conferencing software used at the beginning of the project to that used at the end. Meeting as a group tended to keep us on task and we were able to help each other out when one of us got stuck. Our attention tended to flag when we switched conferencing software and no longer met as a group."

- "The first distance-education software was so much better. We needed the first software, we needed time for learning and development. Our interaction during distance-education was good and we did our homework. There came a time when things got overwhelming."

Library educators at Notre Dame noted that the PI's personality came across flat and uninteresting via distance-education technologies. When they met the PI for the first time in March 2002, they remarked on the PI's interest, animation, and energy during presentations and discussion. Although distance-education software was a cost-effective alternative to face-to-face instruction, library

educators preferred face-to-face contact for project activities:

- "Face-to-face was so much better. The enthusiasm and naturalness of Karen's delivery were so much better."

- "Learning in a hands-on environment was better. [We should have] come to Ann Arbor in a second trip. Flash was harder than I thought [and I] had many other responsibilities."

Library educators lamented about the long-term nature of the project. With regard to training, there were so many interruptions that caused them to stop, lose their momentum, relearn important techniques, and push them farther and farther behind. For library educators at Earlham, the long-term nature of the project was one important reason for their dropping out:

- "The amount of work the project required combined with the long term nature of the program contributed to the Earlham team dropping from the program. We were doing the project as an add-on so it was difficult to carve out enough time to work on the project. In addition, the staffing arrangements at Earlham are very fluid and several on the team picked up additional projects or changed work assignments during the duration of the project. Thus, our time was even further divided. Finally, because we have many opportunities at Earlham for live instruction of our students, our motivation for creating a multimedia lesson was not as high as it might have been under other circumstances."

The long-term nature of the project, the desire for more hands-on experience and more face-to-face contact, and the constant interruptions that made it hard for participants to maintain their momentum made library educators think about how they would redesign a training program for educators like themselves. One Notre Dame educator underlined the problem with the comment "Spreading out [the training] over a long time, you mix this activity with all your other activities and everything becomes disjointed." One educator who was able to do the lion's share of development made her own immersive experience by purchasing a book on Flash and learning Flash in a short period of time by doing the exercises in the

book.

Of the many suggestions that library educators made for redesigning a training program, three themes were present: (1) make it an immersive experience over a short period of time, (2) make it a hands-on face-to-face experience, and (3) if training cannot be accomplished in a one multiple-day period, design a set of immersive, hands-on, face-to-face experiences. Here are their suggestions:

- "Do a series of intensive workshops, make it an immersive experience, even a distance event could be made into an immersive experience. Then bring us together face-to-face for more immersion. [If we do this via distance,] give us an exercise, everyone signs off [the distance program], does the exercise, then we sign back on and resume our work. Set aside a block of time especially in summer when classes are not in session. "

- "An intensive week long seminar probably would have helped tremendously. The persistent problem seemed to be that we had such limited time (due to our work loads at our library) to actually use the software on a regular basis, none of us became proficient with Flash. We ended up farming the work out to others who used Flash on a regular basis. Summer is typically a slower time for us. Perhaps if we had had a Flash crash (or crash Flash) course at the beginning of the summer, we would have had more time to become proficient with the software."

- "Perhaps we could have learned it in a more intensive setting, then done the development [and had] less long-term frustration with the project."

- "I also think that learning Flash in an intensive week or ten days would provide a more effective entry into the using the program. It might still work to have the training done by distance learning, but concentrating into a shorter period would be better."

- "We should have talked about learning Flash in a hands-on approach. It wasn't until after the lessons that we realized we weren't able to do the development. ACRL has 4.5 days of immersion about for information literacy. We should have done something similar for Flash. Distance just

didn't work for learning Flash. The long attenuated process for learning Flash was just too long. "

- "I would have preferred learning Flash in a hands-on manner. Perhaps in a 1-week intensive crash course in Ann Arbor, rather than via web conferencing software. I did not find Flash intuitive at all, and even with all that training, it still would have taken me too much time to develop the tutorial myself. Instead, we ended up having to hire a developer who did it in a fraction of the time it would have taken the two of us."

6.6 Planning for a New Multimedia Project

The planning and production of new multimedia projects to follow on the heels of the work effort done in the LUMENS Project would be a positive outcome. The four groups that successfully developed and evaluated a multimedia show for this project mentioned their intent to follow up with plans for new multimedia projects but they would first need to "get their ducks in a row" with advanced planning that included: (1) getting support from the library administration, e.g., getting release time, acknowledging multimedia production as a priority activity, etc., (2) assembling a development team made up of experts in the various facets of multimedia production, e.g., content experts, artistic and creative talent, programmers, usability testers, etc., and (3) securing long-term support for completed shows to enhance them with new content, update content due to changes to systems and services, refresh links, etc. Library educators had a lot to say in this regard:

- "[I'd do development] if the library administration would let me do everything else half time."

- "[LUMENS staff developer] Michael Spaly was excellent and very responsive. If we had a Michael working on things, we could do multimedia development. Our [original] developer wasn't as experienced as Michael. If someone like Michael was around, we could do it. We had grandiose plans too and it took some learning to determine what to pack into the show. We wanted to do surveys, more involvement in each

section, quizzes, and what we eventually did was plenty."

- "Given the content, we could hand things to a creative person, graphics department, and a technical person. In some institutions, there is this support but we don't have it. We could have gotten a graphics student to do some work and integrate [our work] into [the] student's coursework. It would also help to get students who have some library knowledge."

- "[We would need] money and expertise and a person who is an instruction librarian who also has multimedia skills. Now new job ads have a requirement for multimedia skills."

- "[We library educators have] learned how to do the basics. To do interactive things, the learning curve goes up exponentially. I couldn't have done what Michael Spaly did. In the future I'd just hire someone to do the development … Also there is the maintenance if the interface ever changes. It increases the time commitment on the part of the librarian to put this tutorial together."

- "It our job to come up with idea and content and the library comes up with the money to find someone to do the development. [Other institutions have] whole teams of developers. This is what we need."

- "[Maintaining a multimedia show] is much more time consuming than [teaching] a class. If there are changes to the system, your whole tutorial needs to be changed. We developed our tutorial purposely so it wouldn't be connected to a resource because of ongoing maintenance later."

- "Get reference staff together, find out what instruction needs to be done, [make sure] everyone knows what others want, get someone to talk about what is needed, and … reprioritize. Then have a separate unit that builds what the reference staff wants."

6.7 The Role of Library Educators in Multimedia Production

- "I got so intimidated by learning Flash. Too many other things going on

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to learn Flash. It wasn't that I didn't want to learn it. Knowing what I know, I don't know if I'd want to spend my time doing the actual development. Other things turn me on. I like coming up with the idea, the vision, but not the development. Realistically, in terms of development, someone else can do it."

The above quote sums up the role that this project's library educators want to take in future multimedia production work for library-user education. Her colleague at UIC asserted "Our strengths were in content, organization, not design and development." These UIC educators have already started talking with their department head about where they want to go next with online tutorials. Most likely, they will enhance content in terms of telling the role the Boolean OR and NOT operators in online retrieval, in fact enhancements that users themselves suggested during the evaluation. In terms of the development work, library educators would "do the storyboard because doing the technical part was really painful. There's a part of me that wants to know how to do it but just enough to know what it can and can't do." Then they would seek creative talent and technical staff to do Flash authoring and programming tasks.

Having a completed multimedia show under their belts, so to speak, should be a boon to this project's library educators in terms of initiating new development efforts at their institution. UIC library educators tell why:

- "Our tutorial is getting our department to think about what we need to do about online instruction. We have something to show them and what we envision. Otherwise, we would probably not be talking about online instruction with our superiors. Also our department head sees what we are capable of accomplishing and what multimedia tutorials are all about so that she is more likely to support us in developing and planning future tutorials."

UIC library educators were also very articulate about their future role in multimedia production efforts:

- "Content development is the librarian's role. Project objectives,

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identifying the show's audience, generating a storyboard, testing shows for usability are the librarian's responsibility. Give development to someone else. I would have like to have learned Flash more than I did. Setting up a timeline, managing the project, determining what resources are needed—these are things I can do."

- "What I came out with was more valuable than just learning Flash. How can one develop an online training program without knowing all that is involved—vision, objectives, audience, money, people, technical expertise, technical limitations? These are much more important skills to me as a librarian than having to learn how to develop something in Flash. This makes for a whole new role for me. Someone who orchestrates the whole [multimedia production] activity."

- "[Prior to the LUMENS Project,] we were talking about coordinating our efforts to put our library's instructional support on the web. And this project helped me to understand what is possible. This puts us on the track for addressing long-term goals for instruction for the Health Sciences. [I now have a better idea of] what it takes to see the big picture of doing library instruction in a big way."

- "Here are our outcomes. We have a good tutorial that we like. We feel that this tutorial is good for the freshman English courses we teach, we finished a research project, we have related software and equipment. We have experience in the IRB (Institutional Review Board) process, doing user testing, testing [before-and-after] questionnaires. We completed usability testing and [made changes to our tutorial based on user comments]. Especially for the next time we do a tutorial, we will know the full range of user testing that is necessary, we will have done every step that an ideal project should do. When libraries build a tutorial, they usually don't do the evaluation, usability testing, they build it and throw it up there. Now we know what to do and we know how long it takes.

7   LUMENS Project Outcomes

7.1   Work Effort, Data, and Analyses Achieve LUMEN's Project Objectives

LUMENS Project staff and participants were successful at achieving the project's four objectives:

1.   Instruct project participants in interactive multimedia production. Sixteen of the project's seventeen original library educators participated in hands-on instruction in interactive multimedia production via distance-education technologies.

2.   Using Macromedia Flash, author interactive multimedia Web sites that support participating libraries' goals for library-user education and information literacy. Of the sixteen library educators who received instruction in multimedia production, ten were successful at completing the production of six interactive multimedia shows including usability testing with prospective users.

3.   Test authored sites to determine whether *interactive multimedia* Web sites are effective vehicles for conveying library-user education content. Of the ten library educators who developed multimedia shows, seven evaluated their shows in a before-after study and one evaluated her show in personal interviews.

4.   Plan for workshops, demonstrations, and immersion programs at which library educators trained in interactive multimedia production can pass their knowledge and skills onto interested staff and colleagues. Because most participating library educators did not do the majority of the development work for their multimedia shows, they are not prepared to plan for and take an active role in these events. Instead, library educators redesigned the instructional program that this project used to teach them about multimedia production and clarified the role that they would feel comfortable playing on future interactive multimedia development teams.

7.2 Library Educators Develop Six Interactive Multimedia Shows

Of the 16 library educators who learned about multimedia production via distance-education technologies, ten were successful at completing the production of six interactive multimedia shows with these titles:

1. Doing Research: An Introduction to the Concepts of Online Searching by Helen Georgas and Annie Armstrong, UIC

2. Finding Authentic Chemical Spectra in the Purdue University Libraries by Song Yu, Purdue

3. How to Read a Scientific Paper by Michael Fosmire, Purdue

4. Hungry for Information? Evaluating Web Sites by Laura Fuderer, Linda Sharp, and Cheri Smith, and Joni Warner, Notre Dame

5. Journals to the Rescue by Jane Kinkus, Purdue, Michael Spaly and Karen Markey, Michigan

6. Keeping Current in Your Field by Sandy De Groote, UIC

The "Participants" page of the LUMENS Project web site features web links to these shows. Educators at other institutions whose patrons can benefit from these shows' content can link directly to these shows from their library's web site or ask show developers to share their authoring file for editing and/or enhancement. Show developers can also publicize their show's availability and share their shows with their colleagues through links to their shows from various library-user education clearinghouses.

7.3 *Interactive* Multimedia Shows Are Effective Teaching Tools

Seven library educators tested three interactive multimedia shows in before-after studies. These shows were effective teaching tools because in all three cases, users' topic knowledge was significantly greater after visiting the sites than before.

7.4 Library Users Benefit from Learning about Library Services and Resources Through Interactive Multimedia Shows

One educator interviewed library users following their use of her multimedia show. As a result of using the show, almost all respondents—graduate students, faculty, and fellows—learned about current-alert services for the first time and almost all signed up or planned to sign up for these services as a result of learning about them through the multimedia show. Their interview responses were proof that they were genuinely interested in current-alert services and recognized how much these services would benefit their research and save on the extra time and effort required to conduct the same online searches over and over again.

7.5 Library Users Want More Interactive Multimedia Shows

The majority of participants in before-after studies and interviews wanted more interactive multimedia shows. Not only did they make suggestions for shows with library-user education content, they want shows with content about their fields of study and about campus life generally.

7.6 Library Users Respond Very Positively to *Interactive* Multimedia Shows

Of the four multimedia shows, "Doing Research" featured the most interactivity. In the evaluation, subjects were especially enthusiastic about the show when asked to rate its usefulness and their enjoyment using it. Over 80% of respondents wanted more shows like it. Clearly, library users respond positively to interactivity in multimedia shows and future developers should make every effort to feature interactivity that drives their shows' messages home.

7.7 Learning Multimedia Production Requires Immersion, Hands-on Experience, and Face-to-Face Contact

Future instructional efforts in interactive multimedia with library educators cannot be done using mostly distance-education technologies. These efforts must

enlist hands-on experience and face-to-face contact in which the instructor is present to monitor educators' progress, answer their questions on the spot, and serve as a source of information, ideas, advice, and support.

Even more important is the need for an immersive learning experience. Library educators are active practitioners who must respond to a wide range of on-the-job demands from superiors, colleagues, and library patrons. Extracting them from the workplace and putting them into a learning environment that is solely devoted to learning multimedia production with a minimum of distractions is necessary. If educators cannot devote long periods of time (about five days at a time) to an immersive event, then instructors should consider scheduling periodic immersive events lasting two or three days over a period of one or two months. If distance-education technologies are used, they could be used in between immersive events in a bulletin-board fashion, that is, announcing in advance when the distance event occurs and posting an instructor online to answer questions, to give advice on educators' progress on assignments and projects, demonstrate techniques, etc.

7.8 Learning about Multimedia Production Should Make Library Educators into Design and Development Team Leaders

The content of immersion programs on multimedia production for library educators should focus on teaching skills, concepts, and knowledge that make library educators into leaders of multimedia design and development teams. Leaders should be responsible for the project generally, for example, formulating the objectives of the multimedia project, securing administrative support, seeking funding, formulating a project timeline, assigning team members to tasks, monitoring task progress, and making sure deadlines are met. When it comes to the design of multimedia shows, team leaders should be charged with generating the idea or message that the multimedia show conveys to users, identifying the show's target audience, drafting usability-test instruments, gaining approval for usability tests from their institution's review boards, conducting usability studies throughout the show's development phase, and promoting the availability of

completed multimedia shows to their institution's learning community. Along with the team's creative talent, leaders should draft pre-development show representations such as the treatment, flowchart, outline, and storyboard. Team leaders would delegate multimedia production to the team's creative talent, programmers, and technical staff but they would remain active monitoring task progress, making sure deadlines are met, and keeping the channels of communication open amongst all involved parties. This means that immersion program content be focused on project management skills in addition to teaching educators about multimedia production generally. However, the objective of such programs should *not* be to transform library educators into multimedia *developers*, instead, these programs should teach educators to *lead* multimedia teams that develop library-user education content.

7.9 Multimedia Production Efforts Could Be Expanded in Libraries

Since "the ink is hardly dry" on this project's final report, it is too early to tell whether the library educators who participated in the LUMENS Project will champion multimedia production at their institutions. This could take several forms, for example, they could initiate new multimedia projects, enhance the one they completed for this project, seek administrative support for the building of multimedia production teams that they lead, etc. Library educators at UIC are taking the first steps toward an expanded multimedia efforts. They are showing their superiors what they were able to accomplish in terms of production, reviewing evaluation findings with them, generating ideas for future projects, speculating on how their library's user-education efforts should include multimedia, and identifying their own roles in these efforts. Library educators at Notre Dame have already taken classes in multimedia production techniques that are alternatives to Flash. In fact, both UIC and Notre Dame educators now monitor new product announcements seeking alternatives to Flash or technologies that will enable them to easily build multimedia content that they can integrate into Flash's authoring environment.

7.10 Summary Outcome Statement

The LUMENS Project demonstrated that interactive multimedia shows were effective teaching tools for library-user education content. The project resulted in recommendations for the redesign of instructional programs for library educators who want to learn multimedia production and for instructional-program content that will train educators to assume the leadership of multimedia design and development teams. Although only time will tell whether this project's participating institutions specifically or the library community generally embraces multimedia production for teaching users about library resources and services, the LUMENS Project made a significant contribution toward increasing our understanding of the role of library educators in multimedia production for library-user education.

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APPENDIX A.

Assessing the Usability of Multimedia Shows:
Interviewer-administered Questionnaire

(Note: To save space, extra space has been eliminated after open-ended questions.)

The purpose of this study is to determine the usability of a web site entitled "Hungry for Information?" I will start by asking you some general questions about using the web. Then I will observe you using the web site. While you use the web site, I will ask you to speak out loud and turn on an audiotape recorder to record your out loud thoughts. When you are done using the web site, I will ask you several questions about the usability of the web site on evaluating information found on the web.

1.   How often do you use a web browser?
     0: more than once a day
     1: once a day
     2: several times a week
     3: once a week
     4: several times a month
     5: once a month
     6: less than once a month

2.   To complete your course work, how often do you use web search engines such as Google, Alta Vista, and Yahoo?
     0: more than once a day
     1: once a day
     2: several times a week
     3: once a week
     4: several times a month
     5: once a month
     6: less than once a month

3.   To complete your course work, how often do you use resources at the library's [insert its name] web site?
     0: more than once a day
     1: once a day
     2: several times a week
     3: once a week
     4: several times a month
     5: once a month
     6: less than once a month

4.   With regard to completing your course work, rate the usefulness of information that you find on the web on a scale of 0 (very useless) to 5 (very useful).
     _____

5.   With regard to completing your course work, rate the usefulness of information that you find on the library's [insert its name] web site on a scale of 0 (very useless) to 5

(very useful).
_____

6. Are you a freshman, sophomore, junior, or senior?
   0: Frosh
   1: Sophomore
   2: Junior
   3: Senior

Now it is time to use the web site. I am here to observe you while you use the web site entitled [fill in here _____]. I want to find out how usable this site is. Please go ahead and use the site. Let's say that you are visiting this site on a tip from a friend. (Or, your instructor has told you to visit this web site on your own in lieu of coming to class next week.) I would like you to speak out loud as you use the web site. I will now turn on the tape recorder to make an audiotape of your out loud thoughts. I will observe you as you use the gateway and remind you to talk aloud as you use it. Please tell me when you are done, I'll then ask a few more questions about the usability of the site. And then we'll be done. Please go ahead, use the web site, and don't forget to speak out loud.

[Interviewer observes the subject.]
For interviewer's notes:

7. In your own words, please tell me this web site's purpose.

8a. How easy or difficult was it to use the various screen controls such as buttons and links?
    0: Very easy
    1: Easy
    2: Difficult
    3: Very difficult

8b. Tell me which buttons and links were difficult to use.

8c. Tell me why these buttons and links were difficult to use.

8d. Tell me how you would improve these buttons and links so they won't be difficult to use in the future.

9a. How frequently did you feel "lost" while using this web site?
    0: Very frequently
    1: Frequently
    2: Infrequently

3: Very infrequently

9b. Tell me where you felt lost.

9c. Tell me why you felt lost.

9d. Tell me how you would improve this site so that or others don't get the same "lost" feeling.

10a. How difficult or easy was it to understand this web site's terminology?
0: Very easy
1: Easy
2: Difficult
3: Very difficult

10b. Tell me what terminology was especially difficult.

10c. Tell me why this terminology was so difficult.

10d. Tell me what terminology you would use instead.

11a. How difficult or easy was it to understand this web site's content?
0: Very easy
1: Easy
2: Difficult
3: Very difficult

11b. Tell me what content was especially difficult.

11c. Tell me why this content was difficult.

12. Tell me what content you expected to find but didn't.

13. How frequently did you find this web site entertaining?
0: Very frequently
1: Frequently
2: Infrequently
3: Very infrequently

14a. Would you recommend this web site to your friends?
0: Yes
1: No
2: Maybe

14b. Tell me [YES: why you would, NO: why you wouldn't, MAYBE: why you are reluctant to] recommend this web site to your friends.

Thank you very much taking part in this research. I will use your responses to help me improve the web site you used today.
Thanks again.

APPENDIX B.

Doing Research: An Introduction
to the Concepts of Online Searching
Pretest Questionnaire at UIC

Questions About Online Searching

Based on your knowledge of online searching, please select the *one* best answer from the list of multiple-choice answers provided to answer each question.

1.   When you have a research topic, what is the most efficient first step?

___ a. Choose a database
___ b. Look for websites on Google
___ c. Identify keywords
___ d. Examine retrieved citations
___ e. Perform a Boolean search

2.   When conducting an online search for a particular topic, why would you use the search term AND?

___ a. To combine concepts
___ b. To add synonyms to the search
___ c. You have to use AND when searching a library catalog or article database
___ d. To broaden the search
___ e. Both a and c

3.   If you searched for "smoking AND teens," your search results would retrieve:

___ a. Citations about smoking
___ b. Citations about teens who smoke
___ c. Citations about teenagers
___ d. Citations about lung cancer
___ e. None of the above

4.   You retrieve more citations in a search for "drug abuse" than you retrieve in a search for "athletes AND drug abuse." This happens because:

___ a. There are so many more citations about "drug abuse" than "athletes" in most databases
___ b. Only those citations that address both "drug abuse" and "athletes" will appear in your list of results
___ c. Most athletes are likely to be drug abusers
___ d. All of the above
___ e. None of the above

5.   Why is "relationship" an inappropriate keyword for the topic "the relationship between the common cold and Vitamin C?"

___ a. It's already been proven that there is no relationship between the common cold and Vitamin C
___ b. The word "relationship" conveys no content that is unique to the search topic
___ c. The word "effects" should be used instead of "relationship"
___ d. All of the above
___ e. None of the above

6.   Given the keywords "global warming" and "environment," which of the following are appropriate synonyms or related terms?

___ a. ozone
___ b. wildlife
___ c. forests
___ d. All of the above
___ e. None of the above

7.   What information are you likely to find in a citation for a journal article?

___ a. Article title
___ b. Journal title
___ c. Author name(s)
___ d. All of the above
___ e. None of the above

8.   Given the topic "What impact has globalization had on the job market?," which of these citations are most likely to address this topic?

___ a. Engardio, Pete et al. "Is your job next? A new round of globalization is sending upscale jobs offshore." *Business Week,* 2/3/2003, Issue 3818, p 50.
___ b. Sanchez, Omar. "Globalization as a Development Strategy in Latin America?" *World Development,* Dec 2003, Vol. 31 Issue 12, p1977, 19 p.
___ c. Battey, Jim. "Strong economy propels San Diego, Los Angeles IT job market growth." *InfoWorld,* 06/14/99, Vol. 21 Issue 24, p. 8.
___ d. Cummins, Bernie. "How to get a good job and keep it." *Journal of Career Planning and Employment,* Fall 1993, 54(1), p. 20.
___ e. None of the above

9.   Given the query "Do low-carbohydrate diets really lower cholesterol?" which of the following would be the most effective search?

___ a. low AND carb
___ b. how to lower cholesterol
___ c. carbohydrates AND diets AND cholesterol
___ d. Atkins diet
___ e. None of the above

10.   Which of the following is *not* an important step in the research process?

___ a. Identifying keywords
___ b. Thinking of synonyms and related terms
___ c. Examining retrieved citations
___ d. Cutting and pasting text from articles into your assignment

___ e. None of the above

Part 2: Questions About You

11. I am a

___ a. Freshman
___ b. Sophomore
___ c. Junior
___ d. Senior

12. My gender is

___ a. Female
___ b. Male

13. My major is

___ a. Undecided
___ b. Other: _____

14. What activities do you use computers for?

___ a. Word processing
___ b. Web searching
___ c. Library research
___ d. Online chat
___ e. Email
___ f. Other: _____

15. How often do you use the Internet?

___ a. Never
___ b. Rarely (once a month)
___ c. Occasionally (once a week)
___ d. Frequently (once a day or more)

16. Prior to today, I have used the "Doing Research" tutorial

___ a. Once
___ b. Never

17. I have attended ___ classes or workshops at the UIC library before.

___ a. No
___ b. One
___ c. Two
___ d. Three or more

18. How often have you used the UIC library?

___ a. Never

___ b. Occasionally (once a month)
___ c. Frequently (once a week or more)

19. What types of online resources have you used before?

___ a. Library catalogs
___ b. Article indexes/databases
___ c. Web search engines (Google, Yahoo, Alta Vista etc.)
___ d. Other: _____

20. Prior to today, were you familiar with how to use the terms AND, OR, NOT to search online databases/search engines?

___ a. Yes
___ b. No

**Thank you for your assistance answering questions about
"Doing Research."**

APPENDIX C.

How to Read a Scientific Paper
Pretest Questionnaire at Purdue

Part 1: Questions About Scientific Papers

Based on your knowledge of a scientific paper, please select one answer from the list of multiple-choice answers provided.

1. The ___ section of a scientific paper typically uses figures to consolidate data in one place for easy reading.

   ___ a. Analysis
   ___ b. Title
   ___ c. Results
   ___ d. Bibliography
   ___ e. None of the above

2. To quickly determine what a scientific paper is about, read its ____.

   ___ a. Title
   ___ b. Introduction
   ___ c. Abstract
   ___ d. Bibliography
   ___ e. None of the above

3. Why do authors list sources in the Bibliography of their scientific papers?

   ___ a. To comply with tradition
   ___ b. To avoid lawsuits in the event that their paper's conclusions are incorrect
   ___ c. To satisfy the editor of the journal in which their scientific paper is published
   ___ d. To enable readers to find the original source, read it, and decide whether they agree with the author's interpretation
   ___ e. None of the above

4. Why would you talk to your friends about a scientific paper you have read to complete an assignment?

   ___ a. To bore them to tears
   ___ b. To help you understand the scientific paper even more
   ___ c. To verify the author's findings
   ___ d. To convince your friends that the author's research is reliable
   ___ e. None of the above

5. What should you do if you don't understand some terminology in the scientific paper you are reading?

   ___ a. Call the author on your cell phone and ask him

___ b. Look the term up in a scientific dictionary
___ c. Skip the term and continue reading
___ d. Scan the paper's Bibliography for a definition
___ e. None of the above

6. In terms of scientific research, what does plagiarism mean?

___ a. Someone has taken an author's ideas and passed them off as their own
___ b. The author has provided readers with enough information to re-do the experiment on their own
___ c. The author has received grant funds from the federal government to conduct the research described in the paper
___ d. Photocopies of the scientific paper can be made free of charge without violating copyright laws
___ e. None of the above

7. When you read a scientific paper, read the Methods section last because:

___ a. It tells how to replicate the author's experiment
___ b. It is the last section in a scientific paper
___ c. It is merely the list of the sources that the author quoted in his/her scientific paper
___ d. It is the hardest section to understand due to the specialized techniques that scientists use to conduct experiments
___ e. None of the above

8. Read the Analysis section of a scientific paper to find out:

___ a. What data have been measured
___ b. Whether the author is disputing claims made by other scientists
___ c. The author's qualifications to conduct the research
___ d. How the author spent the funding agency's money
___ e. None of the above

9. Why would you read a scientific paper instead of a book on the same subject?

___ a. The paper is available online and the book is only available in print
___ b. Only university professors can publish scientific papers in journals
___ c. The paper provides more details on a specific experiment
___ d. Scientific articles in journals are shorter than books
___ e. None of the above

10. The Conclusion section of a scientific paper is sometimes called the ___ section.

___ a. Discussion
___ b. Author Qualifications
___ c. Prior Research
___ d. Abstract
___ e. None of the above

Part 2: Questions About You

Please answer a few questions about yourself.

11. I am a

___ a. Freshman
___ b. Sophomore
___ c. Junior
___ d. Senior

12. My gender is

___ a. Female
___ b. Male

13. I have used the "How to Read a Scientific Paper" web site

___ a. Three or more times
___ b. Twice
___ c. Once
___ d. Never

14. I have attended ___ presentations or workshops on using the library and library resources sponsored by Purdue University Libraries:

___ a. No
___ b. One
___ c. Two
___ d. Three or more

15. My major is:

___ a. Undecided
___ b. Other: _____

**Thank you for your assistance answering questions
about reading scientific papers.**

APPENDIX D.

Evaluating Web Sites
Pretest Questionnaire at Notre Dame

Part 1: Questions About Evaluating Web Sites

Based on your knowledge of evaluating Web sites, please select one answer from the list of multiple-choice answers provided.

1. Which of the following criteria does *not* apply to evaluating the information on Web sites for its truthfulness and reliability:

___ a. Coverage
___ b. Accuracy
___ c. Currency
___ d. Aesthetics
___ e. Objectivity

2. If a Web site recommends that you read sources that are more than ten years old, the Web site is:

___ a. Totally useless especially in scientific fields
___ b. Somewhat useful if used in combination with more up-to-date information from other Web sites
___ c. Very useful especially if you know the Web site's author personally
___ d. All of the above
___ e. None of the above

3. When it comes to the information that you find on the Web, questioning authority means:

___ a. Determining the identify of the person who authored the Web site
___ b. Complying with tradition
___ c. Asking your professor to suggest relevant Web sites for your assignment
___ d. Running a stop sign
___ e. None of the above

4. Which of the following features of a Web site is a way of learning about an author's qualifications about a topic?

___ a. The site's "about the author" paragraph
___ b. An link to the author's email address
___ c. The author's telephone number at work or at home
___ d. All of the above
___ e. None of the above

5. A Web site that includes links to related Web sites as well as lists of further reading material addresses which important criterion for evaluating Web sites?

___ a. Coverage
___ b. Accuracy
___ c. Obstinacy
___ d. Copyright
___ e. None of the above

6. A Web site that contains multiple grammatical and spelling errors suggests that _____ is a problem.

___ a. Editing
___ b. Theory
___ c. Accuracy
___ d. Context
___ e. None of the above

7. Web sites that are sponsored by two different non-profit organizations are very likely to present conflicting views on the same topic because:

___ a. Non-profit organizations are not trying to make a profit from their Web sites
___ b. Non-profit organizations reflect the strongly-held beliefs of their respective memberships
___ c. Non-profit organizations are tax exempt
___ d. All of the above
___ e. None of the above

8. A Web site that says "Under Construction" suggests that ___ is a problem.

___ a. The company that sponsors the web site
___ b. The author's health
___ c. Traffic congestion
___ d. The author's qualifications to report on the topic
___ e. None of the above

9. Which of the following statements indicates the currency of the information published at a Web site?

___ a. Last updated on 1998 August 11
___ b. Page last modified on September 15, 2003
___ c. John T. Miller @ 2001
___ d. All of the above
___ e. None of the above

10. When gathering information for a class assignment, why would you bother to evaluate the Web sites you find?

___ a. To impress the professor
___ b. To make sure the information I use in my assignment is trustworthy and reliable
___ c. To avoid plagiarism
___ d. All of the above
___ e. None of the above

Part 2: Questions About You

Please answer a few questions about yourself.

11.   I am a:

___ a. Freshman
___ b. Sophomore
___ c. Junior
___ d. Senior

12.   My gender is:

___ a. Female
___ b. Male

13.   I have attended ___ presentations or workshops on using the library and library
      resources sponsored by the University of Notre Dame Libraries:

___ a. No
___ b. One
___ c. Two
___ d. Three or more

14.   My major is:

___ a. Undecided
___ b. Other: _____

**Thank you for your assistance answering questions
about the "Hungry for Information?" Web site.**

APPENDIX E.

Doing Research: An Introduction
to the Concepts of Online Searching
Post-test Questionnaire at UIC

Part 1: Questions About Online Searching

Applying your knowledge from the "Doing Research: An Introduction to the Concepts of Online Searching" tutorial, please select the *one* best answer from the list of multiple-choice answers provided to answer each question.

1.   The objective of the "Doing Research: An Introduction to the Concepts of Online Searching" tutorial is to:

___ a. Learn how to evaluate the research in journal articles
___ b. Guide people through the initial steps of doing online searches for books and articles on a particular topic
___ c. Find relevant articles using Google or Yahoo
___ d. Encourage you to seek your instructor's assistance when doing research
___ e. None of the above

2.   What is the function of the search term AND?

___ a. To broaden your search results
___ b. To combine concepts
___ c. To think up synonyms
___ d. To search for both plural and singular forms of a keyword
___ e. None of the above

3.   You retrieve fewer citations in a search for "smoking AND cancer" than you retrieve in a search for "smoking." This happens because:

___ a. The search term AND is always required in searches
___ b. Only the citations that satisfy both criteria ("smoking" and "cancer") will be retrieved
___ c. Smoking causes cancer
___ d. All of the above
___ e. None of the above

4.   Why is "effect" an inappropriate keyword for the topic "the effect of television violence on children?"

___ a. "Effect" conveys no content that is unique to the search topic
___ b. The word "relationship" should be used instead of "effect"
___ c. The plural form "effects" should be used instead
___ d. "Effect" is a synonym for other keywords in the search topic
___ e. None of the above

5.   Given the topic "Why do teenagers commit suicide?," which of the following is not

an appropriate synonym or related term?

___ a. teens
___ b. young adults
___ c. youth
___ d. murder
___ e. None of the above

6.   A citation in a database:

___ a. Tells you whether the book or article is easy to read
___ b. Rates the quality of the research presented in the book or article
___ c. Contains all of the identifying information for a particular book or journal article
___ d. All of the above
___ e. None of the above

7.   Given the topic "What views of technology are expressed in Mary Shelley's *Frankenstein?,"* which of these three citations are most likely to address this topic?

___ a. Picart, Caroline Joan ('Kay') S. "Visualizing the Monstrous in Frankenstein Films." *Pacific Coast Philology.* 35(1):17-34. 2000
___ b. Kranzler, Laura. "Frankenstein and the Technological Future." *Foundation: Review of Science Fiction.* 44:42-49. 1988-1989 Winter
___ c. Frost, RJ. "'A Race of Devils': Frankenstein, Dracula, and Science Fiction." *Journal of Dracula Studies.* 5:1-10. 2003
___ d. All of the above
___ e. None of the above

9.   Given the topic "The treatment of depression in the elderly," which of the following would be the most effective search?

___ a. how to cure depression
___ b. depression in the elderly
___ c. treatment AND depression AND elderly
___ d. depression
___ e. None of the above

10.   The next time you are given a research topic, what should you do first?

___ a. Identify keywords
___ b. Examine retrieved citations
___ c. Choose a database
___ d. Look for websites on Google
___ e. None of the above

Part 2: About the "Doing Research" Tutorial

On a scale of 0 to 10, please rate your experience using the "Doing Research" tutorial by placing an "X" on the scale lines below. If you have no opinion, circle "No opinion."

11. On a scale from 0 to 10, please rate how familiar you were with the information presented in the "Doing Research" tutorial.

Not   Very familiar   No
familiar   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

12. On a scale from 0 to 10, please rate how useful the information in the "Doing Research" tutorial was to you.

Not useful   Very useful   No
                                                                              Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

13. On a scale from 0 to 10, please rate how appropriate the "Doing Research" tutorial was for your level of education.

Not appropriate   Very appropriate   No
                                                                              Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

14. On a scale from 0 to 10, please rate how different the "Doing Research" tutorial was from other web sites or tutorials you've used to learn about academic topics.

Not   Very   No
different   different   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

15. On a scale from 0 to 10, please rate the amount of difficulty you think you will have the next time you have to search for information on a research topic.

No   A great deal   No
difficulty   of difficulty   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

16. On a scale from 0 to 10, please rate how enjoyable it was to learn about how to search for information on a research topic using the "Doing Research" tutorial.

Not   Very enjoyable   No
enjoyable   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

17. As a result of using the "Doing Research" tutorial, please rate the amount of change in your confidence in your ability to search for information on a research topic.

No change in   A great deal of   No
my confidence   change in my confidence   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

Part 3: Using the "Doing Research" Tutorial in the Future

Please answer the remaining questions about using the "Doing Research" tutorial and similar tutorials in the future.

18. How likely are you to consult the "Doing Research" tutorial in the future?

___ a. Very likely > Go to question 19
___ b. Somewhat likely > Go to question 19
___ c. Somewhat unlikely > Go to question 20
___ d. Very unlikely > Go to question 20

19. Why might you consult the "Doing Research" tutorial in the future?

_____
_____
_____

(Please skip to question 21.)

20. Why would you be unlikely to consult the "Doing Research" tutorial in the future?

_____
_____
_____

21. How likely are you to recommend the "Doing Research" tutorial to your friends?

___ a. Very likely > Go to question 22
___ b. Somewhat likely > Go to question 22
___ c. Somewhat unlikely > Go to question 23
___ d. Very unlikely > Go to question 23

22. Tell why you would recommend the "Doing Research" tutorial to your friends.

_____
_____
_____

(Please skip to question 24.)

23. Tell why you would *not* recommend the "Doing Research" tutorial to your friends.

_____
_____
_____
_____

24. Would you have preferred learning this content in a classroom setting or by asking a librarian, rather than through an online tutorial?

_____
_____
_____
_____

25. Would you like to see more tutorials like the "Doing Research" tutorial in the future?

___ a. Yes
___ b. No
___ c. Don't know

26. What topics should these new tutorials address?

_____
_____
_____
_____

**Thank you for your assistance evaluating
the "Doing Research" tutorial.**

APPENDIX F.

How to Read a Scientific Paper
Post-test Questionnaire at Purdue

Part 1: Questions About Scientific Papers

Applying your knowledge of a scientific paper from the "How to Read a Scientific Paper" web site, please select *one* answer from the list of multiple-choice answers below each question.

1. The _____ section of a scientific paper gives readers a brief synopsis of what the paper is all about.

___ a. Title
___ b. Abstract
___ c. Analysis
___ d. Sources
___ e. None of the above

2. The _____ section of a scientific paper provides readers with a list of readings that the paper's author used to add quotes and previous knowledge about the subject to his paper.

___ a. Introduction
___ b. Title
___ c. Abstract
___ d. Bibliography
___ e. None of the above

3. Why would you consult a scientific dictionary while reading a scientific paper?

___ a. To write notes about interesting ideas that come to you
___ b. To look up terms that the author uses that are unfamiliar to you
___ c. To verify the author's findings
___ d. To find scientific papers related to the one you are reading
___ e. None of the above

4. When you read the _____ section of a scientific paper, you are likely to find out what research questions the author intends to answer in his/her paper.

___ a. Discussion
___ b. Motivation
___ c. Introduction
___ d. Bibliography
___ e. None of the above

5. In terms of a scientific paper, what does replication mean?

___ a. The author has provided you with enough information to re-do the experiment on your own
___ b. Photocopies of the scientific paper can be made free of charge and without violating copyright laws
___ c. The author has received grant funds from the federal government to conduct the research described in the paper
___ d. Another person has taken an author's ideas and passed them off as their own
___ e. None of the above

6.   The _____ section of a scientific paper tells you how the author conducted his/her experiment.

___ a. Discussion
___ b. Research Questions
___ c. Prior Research
___ d. Methods
___ e. None of the above

7.   Which information is typically found in the Analysis section of a scientific paper?

___ a. What the data mean
___ b. Detailed figures that organize data in one place for easy reading
___ c. The author's qualifications to conduct the research
___ d. How the author spent the funding agency's money
___ e. The resources the scientist read before conducting the experiment

8.   Why would you read a scientific paper instead of a book on the same subject?

___ a. The paper is available online and the book is only available in print
___ b. Scientific papers are published quicker than books so their information is more up to date
___ c. The paper is less expensive and the book is more expensive to buy
___ d. Journal articles are shorter than books
___ e. None of the above

9.   Why do authors use figures to present data in a scientific paper?

___ a. Figures show what the people who took part in the experiment looked like before and after treatment
___ b. Figures organize data in one place for easy reading
___ c. Figures are the author's insurance against lawsuits for falsifying data
___ d. Figures enable authors to collect royalties on replications of their experiments
___ e. None of the above

10.   The conclusion section of a scientific paper is sometimes called the ___ section.

___ a. Abstract
___ b. Author qualifications
___ c. Prior research
___ d. Discussion
___ e. None of the above

Part 2: About the "How to Read a Scientific Paper" Web Site

Using scales that range from 0 (No, not, or none of…) to 10 (A great deal of…), please rate your experience using the "How to Read a Scientific Paper" web site by placing "X" on or under the scale lines below. If you have no opinion, place an "X" under NO (for <u>N</u>o Opinion).

11.   On a scale from 0 (No familiarity) to 10 (A great deal of familiarity), please rate how familiar you were with the information presented in the "How to Read a Scientific Paper" web site.

No   A great deal of   No
familiarity   familiarity   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

12.   On a scale from 0 (No useful information) to 10 (A great deal of useful information), please rate how useful the information in the "How to Read a Scientific Paper" web site was to you.

No useful   A great deal of   No
information   useful information   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

13.   On a scale from 0 (Not different) to 10 (Very different), please rate how different the character of the "How to Read a Scientific Paper" web site was from other web sites you've used to learn about academic matters.

Not   Very   No
different   different   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

14.   On a scale from 0 (No difficulty) to 10 (A great deal of difficulty), please rate the amount of difficulty you think you will have the next time you have to read a scientific paper.

No   A great deal   No
difficulty   of difficulty   Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

15.   On a scale from 0 (No enjoyment) to 10 (A great deal of enjoyment), please rate how enjoyable it was to learn about how to read a scientific paper using the "How to Read a Scientific Paper" web site.

| No | | | | | | | | | | A great deal of | No |
| enjoyment | | | | | | | | | | enjoyment | Opinion |

0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

16. As a result of using the "How to Read a Scientific Paper" web site, please rate the amount of change in your confidence in your ability to read a scientific paper.

| No change in | | | | | | | | | | A great deal of | No |
| my confidence | | | | | | | | | | change in my confidence | Opinion |

0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10   NO

Part 3: Using the "How to Read a Scientific Paper" Web Site in the Future

Please answer the remaining questions about using the "How to Read a Scientific Paper" web site and similar web sites in the future.

17. How likely are you to consult the "How to Read a Scientific Paper" web site in the future?

___ a. Very likely > Go to question 18
___ b. Somewhat likely > Go to question 18
___ c. Somewhat unlikely > Go to question 19
___ d. Very unlikely > Go to question 19

18. What would be the impetus for you to consult the "How to Read a Scientific Paper" web site in the future?

_____
_____
_____

(Please skip to question 20.)

19. Why would you be unlikely to consult the "How to Read a Scientific Paper" web site in the future?

_____
_____
_____

20. How likely are you recommend the "How to Read a Scientific Paper" web site to your friends?

___ a. Very likely > Go to question 21
___ b. Somewhat likely > Go to question 21
___ c. Somewhat unlikely > Go to question 22
___ d. Very unlikely > Go to question 22

21. Tell why you would recommend the "How to Read a Scientific Paper" web site to your friends.

_____
_____
_____

(Please skip to question 23.)

22. Tell why you would *not* recommend the "How to Read a Scientific Paper" web site to your friends.

_____
_____
_____

23. Would you like more web sites like the "How to Read a Scientific Paper" web site?

___ a. Yes > Go to question 24
___ b. No
___ c. Don't know

24. What topics should these new web sites address?

_____
_____
_____

**Thank you for your assistance evaluating the
"How to Read a Scientific Paper" web site.**

APPENDIX G.

Evaluating Web Sites
Post-test Questionnaire at Notre Dame

Part 1: Questions About Web Sites

Applying your knowledge of the "Hungry for Information" Web site, please select *one* answer from the list of multiple-choice answers below each question.

1. The objective of the "Hungry for Information" Web site is to learn how to:

___ a. Make cocoa
___ b. Distinguish between library resources and Web sites
___ c. Evaluate Web sites
___ d. Search the Web
___ e. None of the above

2. What acronym did the "Hungry for Information" Web site use to teach you about the five criteria for evaluating information on the Web?

___ a. C A N D Y
___ b. C A F E
___ c. C O C O A
___ d. C A C A O
___ e. None of the above

3. If you find an older Web site, what should you do?

___ a. Dismiss it entirely
___ b. Supplement the information you find at the older site with more current information from an up-to-date site
___ c. Email the authors and tell them to update their site
___ d. Count the Web site's links to related sites
___ e. None of the above

4. On the Web, questioning authority means:

___ a. Determining the author's qualifications to publish the information on the Web page that interests you
___ b. Assessing the length of the Web page that interests you
___ c. Conducting the same search for an author on more than one Web search engine
___ d. Running a red light
___ e. None of the above

5. Why is it important to distinguish between an author whose Web site represents an organization and the same author's personal Web site?

___ a. The organization's Web site is slicker, more attractive, and more pleasing to the eye

than the author's personal Web site.

___ b. The author's Web site is less likely to be as current and up-to-date as the organization's Web site

___ c. The author's personal Web site may reflect the author's personal opinion on an important matter but not the organization's stance on the same matter.

___ d. All of the above

___ e. None of the above

6.   What features of a Web site would indicate thorough coverage of a topic?

___ a. Definitions of terms

___ b. Contextual background

___ c. Dates of events

___ d. All of the above

___ e. None of the above

7.   Which tip helps you to determine a Web site's accuracy?

___ a. Your roommate uses the Web site all the time

___ b. The Web site's authors cite the sources they used to develop their site

___ c. A professional Web designer created the Web site

___ d. The site is unusually lengthy

___ e. None of the above

8.   If you were looking for trustworthy health information, which of the following characteristics would indicate that the Web site's information might *not* be objective?

___ a. The Web site is sponsored by a major pharmaceutical company

___ b. The Web site has current up-to-date information

___ c. The Web site presents several conflicting arguments

___ d. The Web site says that it is "Under Construction"

___ e. All of the above

9.   Which Web page element indicates the currency of the information on the Web site?

___ a. The author's birthdate

___ b. The number of links to other Web sites

___ c. The copyright date

___ d. The author's name

___ e. None of the above

10.   Your failure to apply the five criteria for evaluating the information you find on Web sites is likely to result in:

___ a. A poor grade on your assignment

___ b. An incorrect decision that could affect your health and well-being

___ c. An unsatisfactory career move

___ d. All of the above

___ e. None of the above

Part 2: About the "Hungry For Information" Web Site

Using scales that range from 0 (No, not, or none of…) to 10 (A great deal of…), please rate your experience using the "Hungry For Information" Web site by placing "X" on or under the scale lines below. If you have no opinion, place an "X" under NO (for <u>N</u>o <u>O</u>pinion).

11.   On a scale from 0 (No familiarity) to 10 (A great deal of familiarity), please rate how familiar you were with the information presented in the "Hungry For Information" Web site.

No familiarity	A great deal of familiarity	No Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10		NO

12.   On a scale from 0 (No useful information) to 10 (A great deal of useful information), please rate how useful the information in the "Hungry For Information" Web site was to you.

No useful information	A great deal of useful information	No Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10		NO

13.   On a scale from 0 (Not different) to 10 (Very different), please rate how different the character of the "Hungry For Information" Web site was from other Web sites you've used to learn about academic matters.

Not different	Very different	No Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10		NO

14.   On a scale from 0 (No difficulty) to 10 (A great deal of difficulty), please rate the amount of difficulty you think you will have the next time you have to evaluate a Web site.

No difficulty	A great deal of difficulty	No Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10		NO

15.   On a scale from 0 (No enjoyment) to 10 (A great deal of enjoyment), please rate how enjoyable it was to learn about how to evaluate a Web site using the "Hungry For Information" Web site.

No		A great deal of	No
enjoyment		enjoyment	Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10			NO

16. As a result of using the "Hungry For Information" Web site, please rate the amount of change in your confidence in your ability to evaluate a Web site.

No change in		A great deal of	No
my confidence		change in my confidence	Opinion
0-------1-------2-------3-------4-------5-------6-------7-------8-------9-------10			NO

Part 3: Using the "Hungry For Information" Web Site in the Future

Please answer the remaining questions about using the "Hungry For Information" Web site and similar web sites in the future.

17. How likely are you to consult the "Hungry For Information" Web site in the future?

___ a. Very likely > Go to question 18
___ b. Somewhat likely > Go to question 18
___ c. Somewhat unlikely > Go to question 19
___ d. Very unlikely > Go to question 19

18. What would be the impetus for you to consult the "Hungry For Information" Web site in the future?

_____
_____
_____

(Please skip to question 20.)

19. Why would you be unlikely to consult the "Hungry For Information" Web site in the future?

_____
_____
_____

20. How likely are you to recommend the "Hungry For Information" Web site to your friends?

___ a. Very likely > Go to question 21
___ b. Somewhat likely > Go to question 21
___ c. Somewhat unlikely > Go to question 22
___ d. Very unlikely > Go to question 22

21. Tell why you would recommend the "Hungry For Information" Web site to your friends.

_____
_____
_____
(Please skip to question 23.)

22.   Tell why you would *not* recommend the "Hungry For Information" Web site to your friends.

_____
_____
_____

23.   Would you like more web sites like the "Hungry For Information" Web site?

___ a. Yes > Go to question 24
___ b. No
___ c. Don't know

24.   What topics should these new Web sites address?

_____
_____
_____

**Thank you for your assistance evaluating the
"Hungry For Information" Web site.**

APPENDIX H.

Keeping Current in Your Field
Interview Questionnaire at UIC

[Note: This interview form will be used as the script for the interview. The PI or the Co-PI will read the questions allowed to the subject and write the subjects answers on the interview form. The PI will screen faculty and graduate students to prior to the interview to arrange interview times with only potential subjects who have viewed the tutorial.]

Part 1: Questions About You

Please answer the following questions about yourself.

1. I am:

___ a. Faculty
___ b. Graduate student
___ c. Resident (medical or dental)
___ d. Other: _____

2. How do you keep current in the areas of research, teaching, and/or practice in which you are an expert?

(Probe: Do you search online databases, read the journals to which you subscribe, scan current journals in the library, subscribe to a table of contents service, rely on an assistant to do the work, talk to colleagues etc.)

Part 2: Questions About Automatic Keeping-Current Services

Please answer the following questions about subscribing to and using automatic Keeping Current services in online databases.

3. Tell me about your online searches of medical databases.

What is the impetus for doing an online search, for example, would you be researching a grant, learning about a new medical breakthrough, keeping up to date on your research, etc.?

What databases do you search?

Do you delegate searching to an assistant or to a librarian? If yes, what exactly does the librarian do for you? What does the assistant do for you? How do you learn from the fruits of the assistant's labors? For example, does the assistant sift through the results, find the most useful articles, read them, and then summarize their contents to you in a report or conversation, etc.?

4. How likely are you to conduct multiple searches on the *exact same* topic or idea over a set period of time? (If the person asks about length of time, you respond that the person could set the length of time—a day, week, month, etc.)

___ a. Very likely
___ b. Somewhat likely
___ c. Somewhat unlikely
___ d. Very unlikely

5.   When did you last visit the "Keeping Current in Your Field" tutorial?

___ a. Today
___ b. Yesterday
___ c. A few days ago
___ d. A week ago
___ e. More than a week ago

6.   How many times have you visited the "Keeping Current in Your Field" web site?

___ a. Never
___ b. Once
___ c. Twice
___ d. Three or more times

7A.   The objective of the "Keeping Current in Your Field" web site is to give you special instructions for signing up for SDI searches in the MEDLINE database so that MEDLINE automatically sends you the most up-to-date citations on a topic of interest at regular intervals of time that you set—daily, weekly, monthly, etc. How effective was the "Keeping Current in Your Field" web site in achieving this objective?

___ a. Very effective> 8
___ b. Somewhat effective> 8
___ c. Somewhat ineffective> 7B
___ d. Very ineffective> 7B

7B.   Please tell me how the "Keeping Current in Your Field" web site could be made more effective.

8A.   Are you now subscribed to the automatic MEDLINE SDI service?

___ a. Yes> 8B
___ b. No> 8C

8B.   Did you subscribe to the automatic MEDLINE SDI service as a result of using the "Keeping Current in Your Field" web site?

___ a. Yes> 9
___ b. No> 8D

8C.   As a result of using the "Keeping Current in Your Field" web site, how likely are you to subscribe to the automatic MEDLINE SDI service in the future?

___ a. Very likely> 9
___ b. Somewhat likely> 9
___ c. Somewhat unlikely> 8E

___ d. Very unlikely> 8E

8D.   What was the impetus for your subscription to the automatic MEDLINE SDI service?

How did you learn about the service?

Did you sign up for the service on your own, did someone help you, or did you ask someone to sign up for you?

What difficulties did you have signing up for the service?

How long have you been signed up for the service?

Have you made changes to your original profile or the frequency with which you receive updates? Can you recall what changes you've made? How often do you make changes?

(Go to 9>)

8E.   Why are you not likely to subscribe to the automatic MEDLINE SDI service?

9A.   Do you subscribe to other automatic SDI services?

___ a. Yes> 9B
___ b. No> 9C

9B.   Tell me what other automatic SDI services you subscribe to.

(Go to 10>)

9C.   Why haven't you signed up for other automatic SDI services?

10.   In terms of your interests and knowledge, what was the most important information that the "Keeping Current in Your Field" web site conveyed to you?

11.   If you learned something new from the "Keeping Current in Your Field" web site, what was it?

Part 3: About the "Keeping Current in Your Field" Web Site

I will now read you a series of questions where I would like you to rate the Keeping Current in your Field Website. Using scales that range from 0 (No, not, or none of…) to 10 (A great deal of…), please rate your experience using the "Keeping Current in Your Field" web site. If you have no opinion, please tell me "No" (for No Opinion).

12.   On a scale from 0 (No familiarity) to 10 (A great deal of familiarity), please rate how familiar you were with the information presented in the "Keeping Current in Your Field" web site.

No familiarity	A great deal of familiarity	No Opinion
0------1------2------3------4------5------6------7------8------9------10		NO

13. On a scale from 0 (No useful information) to 10 (A great deal of useful information), please rate how useful the information in the "Keeping Current in Your Field" web site was to you.

No useful   A great deal of   No
information   useful information   Opinion
0------1------2------3------4------5------6------7------8------9------10   NO

14. On a scale from 0 (Not different) to 10 (Very different), please rate how different the character of the "Keeping Current in Your Field" web site was from other web sites you've used to learn about academic matters.

Not   Very   No
different   different   Opinion
0------1------2------3------4------5------6------7------8------9------10   NO

15. On a scale from 0 (No difficulty) to 10 (A great deal of difficulty), please rate the amount of difficulty you think you will have when you subscribe to and profile your interests in web site for an automatic SDI services.

No   A great deal   No
difficulty   of difficulty   Opinion
0------1------2------3------4------5------6------7------8------9------10   NO

16. On a scale from 0 (No enjoyment) to 10 (A great deal of enjoyment), please rate how enjoyable it was to learn about how to subscribe to and profile your interests using the "Keeping Current in Your Field" web site.

No   A great deal of   No
enjoyment   enjoyment   Opinion
0------1------2------3------4------5------6------7------8------9------10   NO

17. As a result of using the "Keeping Current in Your Field" web site, please rate the amount of change in your confidence in your ability to subscribe to and profile your interests in web site for an automatic SDI services.

No change in   A great deal of   No
my confidence   change in my confidence   Opinion
0------1------2------3------4------5------6------7------8------9------10   NO

Part 3: Using the "Keeping Current in Your Field" Web Site in the Future

Please answer the remaining questions about using the "Keeping Current in Your Field" web site and similar web sites in the future.

18. How likely are you to consult the "Keeping Current in Your Field" web site in the future?

___ a. Very likely > Go to question 19
___ b. Somewhat likely > Go to question 19
___ c. Somewhat unlikely > Go to question 20
___ d. Very unlikely > Go to question 20

19. What would be the impetus for you to consult the "Keeping Current in Your Field" web site in the future?

_____
_____
_____

(Please skip to question 21.)

20. Why would you be unlikely to consult the "Keeping Current in Your Field" web site in the future?

_____
_____
_____

21. How likely are you recommend the "Keeping Current in Your Field" web site to your friends and colleagues?

___ a. Very likely > Go to question 22
___ b. Somewhat likely > Go to question 22
___ c. Somewhat unlikely > Go to question 23
___ d. Very unlikely > Go to question 23

22. Tell why you would recommend the "Keeping Current in Your Field" web site to your friends.

_____
_____
_____

(Please skip to question 24.)

23. Tell why you would *not* recommend the "Keeping Current in Your Field" web site to your friends and colleagues.

_____
_____
_____

24. Would you like more web sites like the "Keeping Current in Your Field" web site?

___ a. Yes > Go to question 25
___ b. No
___ c. Don't know

25. What topics should these new web sites address?

_____
_____
_____

**Thank you for your assistance evaluating the
"Keeping Current in Your Field" web site.**