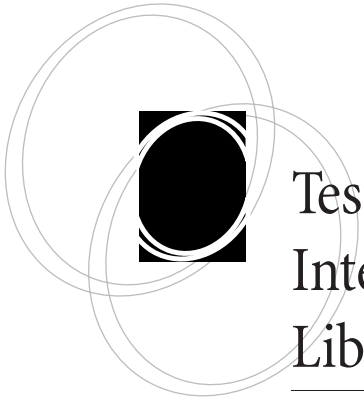
Testing the Effectiveness of Interactive Multimedia for Library-User Education

Markey, Karen.
Armstrong, Annie.
De Groote, Sandy.
Fosmire, Michael.

portal: Libraries and the Academy, Volume 5, Number 4, October 2005, pp. 527-544 (Article)

Published by The Johns Hopkins University Press
DOI: 10.1353/pla.2005.0056



Testing the Effectiveness of Interactive Multimedia for Library-User Education

Karen Markey, Annie Armstrong, Sandy De Groote, Michael Fosmire, Laura Fuderer, Kelly Garrett, Helen Georgas, Linda Sharp, Cheri Smith, Michael Spaly, and Joni E. Warner

abstract: A test of the effectiveness of interactive multimedia Web sites demonstrates that library users' topic knowledge was significantly greater after visiting the sites than before. Library users want more such sites about library services, their majors, and campus life generally. Librarians describe the roles they want to play on multimedia production teams after working on the LUMENS Project.

Introduction

In *portal*'s October 2003 issue, this paper's principal author described the LUMENS Project to train librarians to build interactive multimedia shows using Macromedia Flash and to enlist library users in a test of these shows to determine whether interactive multimedia shows are effective vehicles for conveying library-user education content.[1] Joining the author in this issue of *portal* are her colleagues at three of the four participating libraries to summarize the project's training and development phases and to give the results of the evaluation of the interactive multimedia shows that they developed. The results include a think piece in which project staff and participating librarians take stock of all aspects of the LUMENS Project to determine whether interactive multimedia production is a viable activity for academic libraries, the role of librarians on interactive multimedia production teams, and how to involve others in production efforts at their own libraries and beyond.

portal: Libraries and the Academy, Vol. 5, No. 4 (2005), pp. 527–544.

Training for Interactive Multimedia Production

Because this project's librarians were resident at four library systems—Earlham College, Purdue University, University of Illinois Chicago (UIC), and University of Notre Dame—the project's principal investigator (PI) and this paper's principal author at the University of Michigan (UM) used distance-education technologies almost exclusively to train librarians in interactive multimedia production. (See the LUMEN's Project Web site and final report for the full list of training topics delivered via the Webex and Centra Web-based conferencing programs.[2]) Shortly after training began, LUMENS Project staff and participating librarians gathered in Ann Arbor for the first and only face-to-face meeting of all participants. An important objective of the meeting was to teach librarians the methodology for developing a multimedia show. Librarians were quick to settle on ideas for their multimedia shows and made progress on the more elaborate representations of their ideas in the form of treatments, outlines, flowcharts, and storyboards before engaging in actual production work.

Completed Multimedia Shows

Listed below are the six ideas that resulted in completed Web-based multimedia shows:

- "Doing Research: An Introduction to the Concepts of Online Searching" by Annie Armstrong and Helen Georgas at UIC, http://www.uic.edu/depts/lib/reference/services/tutorials/DoingResearch.shtml.
  This show's interactive exercises help students learn the basic concepts of doing research online: how to select keywords for a topic, how to identify synonyms and related terms, the importance of the search term, how to formulate effective keyword searches, and how to read a citation.
- "Keeping Current in Your Field" by Sandy De Groote at UIC, http://tigger.uic.edu/~sgroote/sdi/.
  "Keeping Current" addresses faculty, graduate students, researchers, and residents in the health sciences who need to keep current in their field and may not know about the new current-alert services that would help them in this regard. The show covers the benefits of saved searches and demonstrates how to save searches and receive tables of contents from newly published journals that are indexed in the Ovid and PubMed Cubby databases.
- "How to Read a Scientific Paper" by Michael Fosmire at Purdue, http://www.lib.purdue.edu/phys/inst/scipaper.html.
  "Scientific Paper" teaches undergraduate science students how to read a scientific article from the primary literature of their field, gives these students strategies to boost their understanding of scientific articles, and introduces them to the different parts of scientific papers. The show's sarcastic edge, subtle humor, and colorful animated images enliven its text-based subject matter.
- "Journals to the Rescue" by Jane Kinkus at Purdue and Michael Spaly and Karen Markey at Michigan, http://www.si.umich.edu/~ylime/lumens/journalsToTheRescue.html.
  "Rescue" is a two-tiered story in comic-strip form. "Journals to the Rescue" uses vivid information—the story of saving Sparky, a sick Labrador retriever, from a

painful treatment for his ailment—to underline the importance of consulting research in current journals for the latest information.[3] The show's content drives home this one and only important point: read journals for the latest information.

- "Hungry for Information? Evaluating Web Sites" by Laura Fuderer, Linda Sharp, Cheri Smith, and Joni E. Warner at Notre Dame, http://www.library.nd.edu/howdoi/cacao_tutorial.shtml.
  The purpose of "Hungry for Information?" was to teach first-year undergraduate 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.
- "Finding Authentic Chemical Spectra" by Song Yu at Purdue, http://www.lib.purdue.edu/chem/chemspec/index.html.
  This show's purpose was to inform undergraduate students who are enrolled in chemistry classes at Purdue University about print and electronic resources for spectra information, expressly teaching 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.

Testing Students' Topic Knowledge of Library Resources

Before-After Studies for Testing Students' Topic Knowledge

Librarians who were responsible for the development of the three multimedia shows "Doing Research," "Scientific Papers," and "Hungry for Information" 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. Librarians recruited a total of 30 subjects for their shows' evaluations as a result of student response to the flyers that librarians posted in campus buildings where students attend classes and labs.

After subjects signed a consent form, they were 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.

Subjects then used the multimedia site for 15 to 30 minutes. Afterward, 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) 10 multiple-choice questions about multimedia content, (2) 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) 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. Participation in the interviews was completely voluntary, and subjects were paid for their participation.

Demographics of Recruited Students

Data collectors at UIC, Purdue, and Notre Dame met the recruiting target of 30 subjects. At Notre Dame, the number of males and females were about the same (table 1). At UIC, 40 percent of respondents were males, and 60 percent 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 2 summarizes subjects' class rank. 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 percent and 80 percent, respectively). At Purdue, subjects were mostly upperclassmen (63.3 percent). Very small numbers of graduate students participated in the study at Purdue and Notre Dame.

Table 3 shows that the majority (83.3 percent) of recruited Notre Dame subjects had attended one or more workshops. Results were different for UIC and Purdue subjects; on these campuses the majority had never attended a library workshop. At UIC, a very small percentage (10 percent) of subjects had attended such a workshop.

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.

Students' Topic Knowledge Before and After Using Multimedia Shows

Subjects' topic knowledge, measured as the pretest to post-test change in score, was assessed through a one-sample t-test. At Notre Dame, subjects averaged 6.23 correct answers on the pretest and 8.97 correct answers on the post-test. The difference of 2.73 was statistically significant at the $p < .001$ level. At Purdue and UIC, the results were the same, but the differences between pretest and post-test scores were not as dramatic. Purdue subjects averaged 7.67 correct answers on the pretest and 9.43 correct answers on the post-test. The difference of 1.77 was statistically significant at the $p < .001$ level. At UIC, subjects averaged 7.14 correct answers on the pretest and exactly 9 correct answers on the post-test. The difference of 1.86 was statistically significant at the $p < .001$ level.

On the basis of this empirical evidence, project staff and participating librarians are confident that interactive multimedia Web sites are effective vehicles for conveying library-user education content.

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 librarians 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

Table 1

Gender of Recruited Subjects

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

Table 2

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

Table 3

Number of Library Workshops Attended

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

retained 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, statistical tests failed to find a relationship between demographic variables such as gender or class rank and subjects' knowledge of library resources and services. The class rank result was especially interesting because it meant that upperclassmen and graduate students did not score higher on pre- or post-tests than freshmen and sophomores. Although this project's librarians had undergraduates in mind as the intended audience for their sites, these results are proof that students at both undergraduate and graduate levels would benefit from multimedia show content.

Rating the Experience of Learning from the Multimedia Shows

Post-test questionnaires asked subjects to rate the experience using interactive multimedia shows on a scale of 0 to 10. Subjects who did not want to give a rating could choose the response category "no opinion."

Figure 1 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 multimedia shows "Doing Research," "How to Read a Scientific Paper," and "Hungry for Information," respectively, were inserted into the blank.

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). Familiarity ratings given by UIC subjects were spread rather evenly in low, medium, and high ratings. Notre Dame subjects selected medium and high familiarity ratings. Figure 2 summarizes the subjects' responses to the question "On a scale of 0 (not useful) to 10 (very useful), please rate how useful the information presented in this tutorial was to you.

UIC subjects were especially enthusiastic in terms of rating the usefulness of the multimedia show's content. Almost half (46.7 percent) 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. The majority of Purdue subjects rated the multimedia show's content 7 or higher, but five Purdue subjects (16.7 percent) gave ratings of 4 or less.

Figure 3 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 search for information on a research topic (at UIC), read a scientific paper (at Purdue), or evaluate a Web site (at Notre Dame).

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.

Subjects at the three libraries did not respond the same way 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 how to search for information on a research topic (at UIC), read a scientific paper (at Purdue), or evaluate a Web site (at Notre Dame) (figure 4). At UIC,

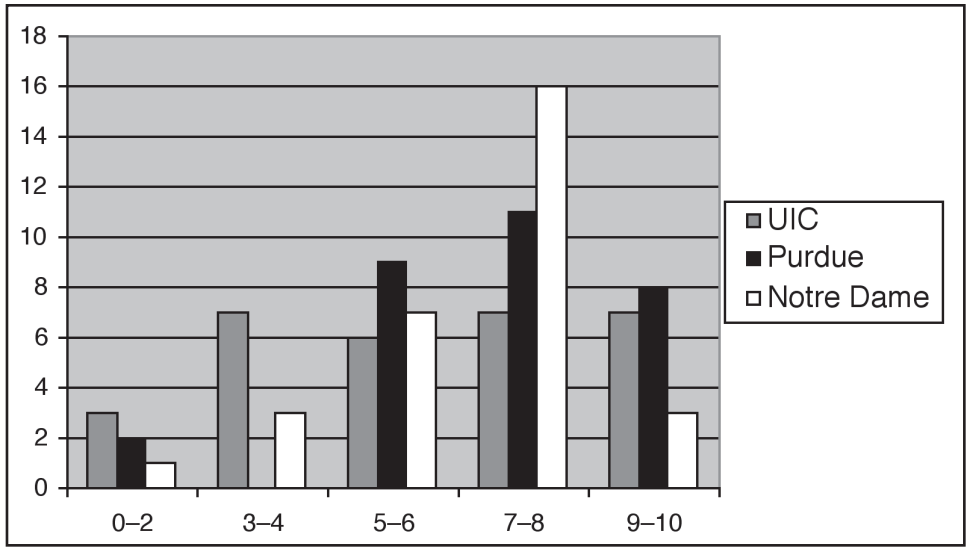


Figure 1. Subjects' post-test ratings for familiarity with tutorial content

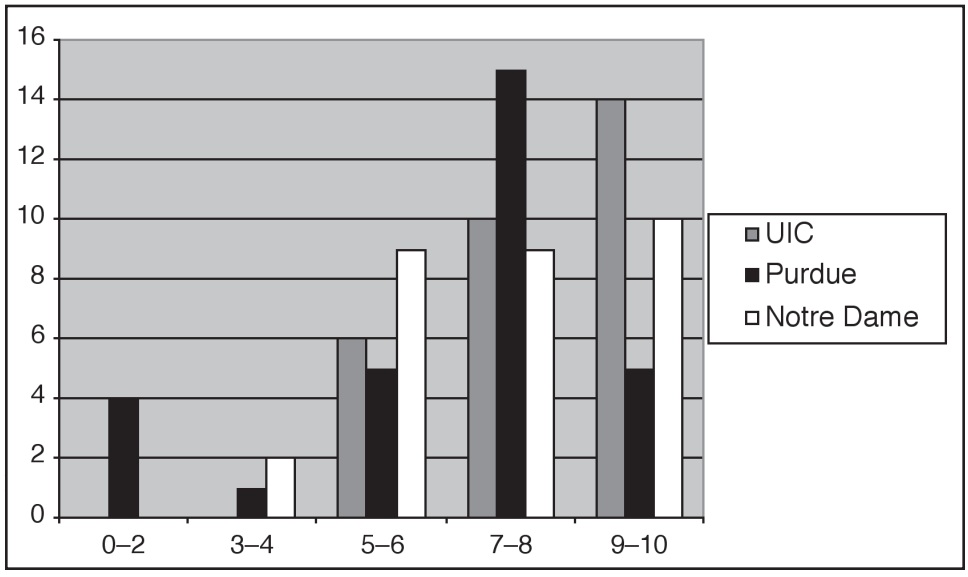


Figure 2. Subjects' ratings for usefulness of tutorial content

the number of subjects giving positive ratings increased steadily until it reached a high of 13 subjects responding with the highest ratings of 9 (3 subjects) and 10 (10 subjects). 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 than Purdue subjects about their enjoyment. The average rating was 6.8. Two-thirds of Notre Dame subjects gave ratings of 7 or higher. Because there was no probe to ask subjects to explain their ratings, we can

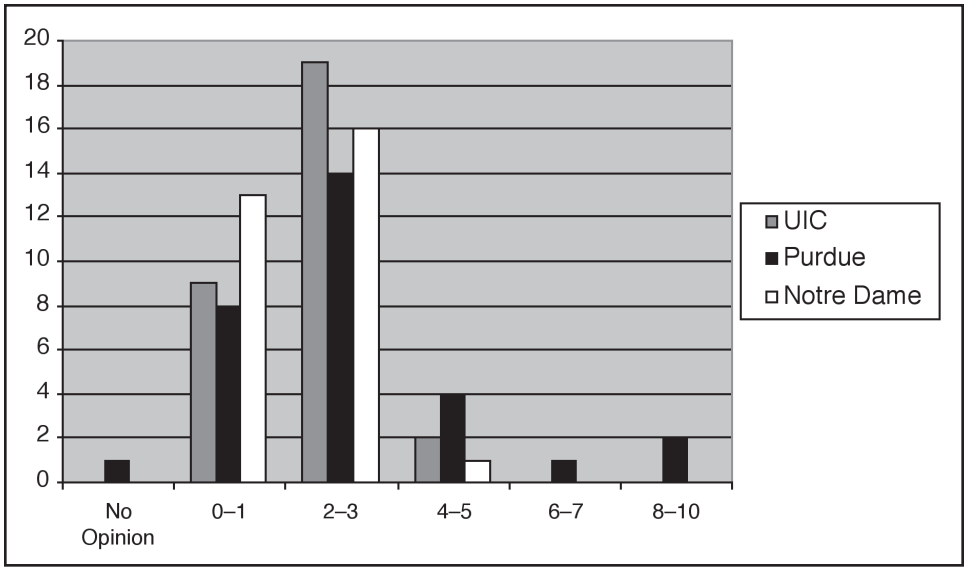


Figure 3. Subjects' ratings for the amount of difficulty doing this task

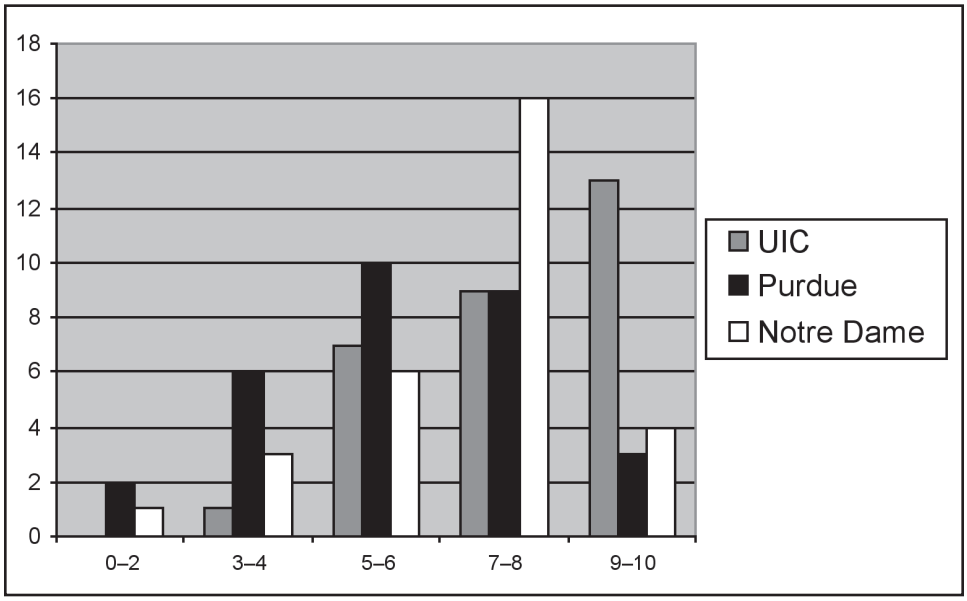


Figure 4. Subjects' ratings for enjoyment learning about this topic

only speculate on the reasons for their ratings. UIC's show about online searching concepts featured more interactivity than the other two shows, and this interactivity could have been the source of enjoyment for UIC subjects. Purdue's designer infused his show with sarcastic humor in an attempt to lighten the presentation of mostly text-based material. Perhaps the Purdue subjects who would have liked a more straightforward treatment were the ones who gave this show its low ratings for enjoyment.

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 search for information on a research topic (at UIC), read a scientific paper (at Purdue), and evaluate a Web site (at Notre Dame)" 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) (figure 5). 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; we then could have compared before and after responses to determine whether their ratings increased as a result of using the tutorial. From the results in hand, we can conclude 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 topic of the tutorial.

Subjects' Future Use of Interactive Multimedia Shows

Closed- and open-ended questions gathered data from subjects on their future use of interactive multimedia shows. Table 4 summarizes subjects' responses to the question "How likely are you to consult this Web site in the future?" 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. Among those likely to revisit, four themes emerged from their statements: (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. 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, such as a useful memory aid or containing 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 a little more than half at UIC) were not likely to consult these multimedia Web sites in the future. At these institutions, typical reasons why subjects would not revisit were: (1) they already knew how to do this (i.e., read a scientific paper or evaluate a Web site), and (2) they learned what was on the site and would not need to revisit it in the future.

A series of post-test questions 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 these questions 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.

UIC subjects were most likely to tell their friends about the services offered (table 5). Most (21 subjects) said that the multimedia site taught information that would be valuable to their peers, and a few (three subjects) said that the site required only a short time commitment. Some remarks from UIC subjects referred indirectly to the interactive and/or multimedia character of this site:[4]

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

Table 4

Likelihood of Revisiting these Multimedia Web Sites

Library	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

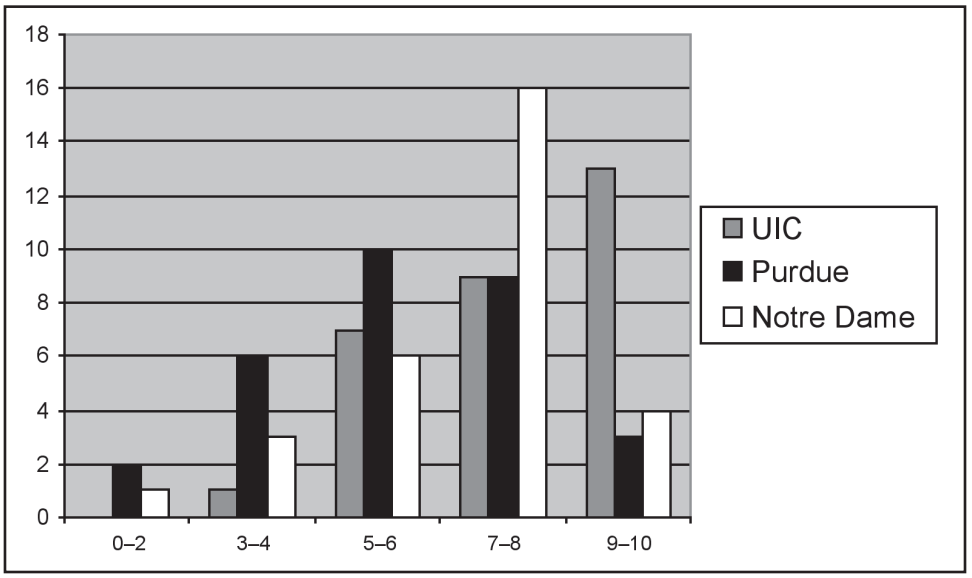


Figure 5. Subjects' ratings for a change in confidence

- "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 . . . and provides an exercise so you can actually perform what's been taught. It's friendly and simple."

More than half of the subjects at both Purdue and Notre Dame were likely to recommend the multimedia show to a friend. Themes that emerged from subjects' comments were: (1) the site is easy to use and learn from, (2) I have friends who need to know how to do this, and (3) the site is attractive, fun, and interactive.

Typical reasons subjects would *not* recommend the multimedia shows to their friends were as follows: (1) my friends already know this information, (2) the site was not help-

Table 5

Recommending these Multimedia Web Sites to a Friend

Library	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

ful to me, (3) my friends and I do not talk about this, or (4) my friends do not do this—meaning reading scientific papers, evaluating Web sites, conducting research.

All but one of 30 UIC subjects wanted more multimedia shows like the one they used in the experiment (table 6). Subjects at Purdue and Notre Dame were less enthusiastic, but half wanted more multimedia Web sites. When asked to suggest topics for new sites, most subjects at the three participating institutions cited topics on the same theme or a theme closely related to the subject of the tutorial they used. For example, at UIC subjects wanted to learn more about using the Boolean operators OR and NOT, doing research for term papers, searching specific databases, and citing sources in term papers.

At all data-collection sites, subjects made suggestions that went beyond content that an academic library might provide for students—for example, how to find jobs, use a particular computer program, learn a foreign language, and choose a major. That this project's subjects looked to the library for direction on undergraduate education services that are the responsibility of many different campus units may lead to new opportunities for libraries to broaden their services and effect collaboration with other campus units. In fact, working in collaboration with writing programs, student services, placement services, computer instructional services, among others may enable the library to leverage the expense of multimedia production teams while improving the visibility of the library, generally.

Interviews with Advanced Researchers About Keeping Current

Librarian Sandy De Groote conducted personal interviews with medical school graduate students and faculty about their impressions of the interactive multimedia show "Keeping Current in Your Field." She chose to conduct personal interviews because she felt that advanced researchers such as faculty, graduate students, and residents might have been intimidated about being tested regarding their knowledge of a particular library service. Her interview schedule collected demographic information, asked researchers how they kept current in their chosen fields, and sought researchers' answers to questions about the multimedia show, including their likelihood of revisiting the

Table 6

More Web Sites Wanted?

Library	UIC		Purdue		Notre Dame	
	No.	%	No.	%	No.	%
Yes	25	83.4	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

multimedia show in the future. Participation was voluntary, and researchers were paid for their involvement.

Signing Up for Current-Alert Services

Of the 15 people who took part in interviews, 10 were graduate students, two were faculty, two were librarians, and one was a fellow (a position above a resident). Most interviewees gave multiple responses to a question about how they kept current in their areas of research, teaching, and practice. All but one interviewee searched online databases to keep current. Nine interviewees read or browsed current journals. One or two people cited other approaches—attending professional conferences, talking to fellow colleagues, consulting a professional society's Web site, and so on. When asked to describe the impetus for their online searches of medical databases, most interviewees cited a single event such as completing class projects, assignments, and papers, keeping current, helping faculty with their research, doing one's own research, preparing for teaching, or preparing for participation in a seminar.

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.

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

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 their profiles. When the inter-

viewer asked interviewees why they had not yet signed up current-alert services, most gave reasons that underscored their inexperience with or lack of knowledge about such services. Other reasons centered on signing up when they expected to be searching Medline on a regular basis or finding the free time to sign up.

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.

Rating the Experience of Learning from the "Keeping Current" Show

Interviewees answered the same questions about rating their experience using interactive multimedia shows as subjects answered in before-after studies. Unlike the before-after studies in which subjects' familiarity averaged between 6.0 and 7.0, interviewees' familiarity with current-alert services was much lower at an average 4.5. Just about half of interviewees rated their familiarity from 0 to 4.

Interviewees were especially enthusiastic in terms of rating the usefulness of the multimedia show content. Two-thirds gave it the highest (10) or next to highest (9) rating, and the mean rating was 8.5. Subjects at UIC 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. We speculated on the reasons why enthusiasm was so high at UIC. Since so few UIC students participate in library workshops (see table 3), perhaps the availability of the multimedia tutorials and their participation in the study put the spotlight on them, gave them needed attention, and they responded with high ratings. On the other hand, both tutorials could have addressed their unexpressed information needs or general curiosity—that is, undergraduate students were genuinely interested in learning about online research concepts, and advanced researchers were pleased to learn about current-alert services to keep abreast of the latest developments on the topics that interest them.

Like their counterparts in the before-after studies, interview respondents did not feel they would have difficulty doing alert-service sign up tasks in the future. In terms of effecting a change in their confidence, the average rating of 7.4 for interviewees was one to three points higher than the average ratings of subjects who participated in before-after studies. Perhaps actions such as signing up and profiling for current-alert services are so much more concrete and objective than the themes of the other multimedia shows that interview respondents were less constrained to give higher rankings than subjects in before-after studies.

Interviewees' Future Use of Interactive Multimedia Shows

In response to the question "How likely are you to consult the 'Keeping Current' Web site in the future?" 60 percent 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 of interviewees were unlikely to revisit the show. Perhaps the face-to-face nature

of the interviews at UIC made people more likely to respond positively to this question because they did not want to offend the interviewer, who they might have felt was responsible for the site's design and development. Reasons why interviewees were likely to revisit were some of the same ones that were mentioned in before-after studies, such as to refresh one's memory or to learn something new. 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.

All 15 interviewees were likely to recommend the "Keeping Current" show to their friends. Again, we attributed the positive support to the face-to-face nature of the interviews in which 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 and colleagues could benefit from knowing about these services.

The Role of Librarians in Multimedia Production

Although this project demonstrated that interactive multimedia sites were effective teaching tools, there were major problems with this project's approaches to teaching librarians about multimedia production and developing the Web sites. To determine what went wrong and identify more effective approaches, the PI queried participating librarians about their experiences in the project. She collected information through e-mail messages, a listserv discussion, phone calls, and face-to-face personal and group interviews. The sections that follow summarize findings in this regard.

Although this project demonstrated that interactive multimedia sites were effective teaching tools, there were major problems with this project's approaches to teaching librarians about multimedia production and developing the Web sites.

The Difficulty of Learning Macromedia Flash and Doing Production

Most librarians agreed that Macromedia Flash was a difficult program to learn and master. During this project's training phase, the PI would teach librarians something new about Flash in distance education broadcasts, and they then would 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. It was difficult for them to find long periods of time to dedicate to learning Flash and to production work generally. Instead, they experienced frequent interruptions—especially ones that required them to stop what they were doing and give their attention to an entirely unrelated task. One librarian summed up the situation in this way:

> 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).[5]

When training for the LUMENS Project started in January 2002, 15 librarians were on board. When the project ended three years later, only eight librarians were active participants on the project. Three librarians dropped out because they took jobs at other institutions. The remaining four dropped out for reasons that pertained to the time-consuming nature of learning Flash and the time required to do pre-production planning and production work.

Originally, the PI planned for librarians to do production work entirely on their own. Only three librarians did the majority of the development on their own, and two of the three consulted one of the project staff developers to assist them with programming difficulties or design work. The remaining librarians relied almost entirely on support from a full-time developer paid through LUMENS Project funds, external grant funds, or a combination of library funds and LUMENS Project funds.

Because few librarians did their own production work, the LUMENS Project did not achieve an important project objective—producing a corps of librarians trained in interactive multimedia production in order to pass their knowledge and skills on to interested staff and colleagues. Several participating librarians made the case for handing development work to a separate development staff, whereas their involvement in multimedia production would be focused on the idea, content expertise, the overall vision of the project, and project management.

Support from Library Administration

All librarians agreed that their participation would have benefited from the unqualified support of their library administration. Not only would they seek such support in the future but they also would impress on library administration that they could not take on additional job responsibilities while involved in multimedia production because of the time-consuming nature of the task.

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 could devote their time and effort to the multimedia project, holding off on assigning staff new responsibilities while the multimedia project is ongoing, and giving high priority to the multimedia project.

Teaching Multimedia Production to Practitioners in the Future

Except for one face-to-face working meeting early in the project's training phase, the principal investigator used distance education technologies exclusively to teach librarians about multimedia production. We used Webex and Centra, two different distance-education technologies; and all of us preferred Webex to Centra because of its real-time audio capability. Although distance education software was a cost-effective alternative to face-to-face instruction, librarians preferred face-to-face contact for project activities.

Librarians lamented 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 further and further behind. For librarians 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.[6]

Of the many suggestions that librarians 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.

Planning for a New Multimedia Project at Participating Libraries

A positive outcome of the LUMENS Project would be the planning and production of new multimedia projects to follow on the heels of the work effort done in this project. Librarians who participated in the evaluation 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 such as obtaining release time and acknowledging multimedia production as a priority activity, (2) assembling a development team made up of experts in the various facets of multimedia production, such as content experts, artistic and creative talent, programmers, usability testers, among others, and (3) securing long-term support for the development team for enhancing completed shows and updating content due to changes to systems and services.

Having a completed multimedia show under their belts, so to speak, was a boon to this project's librarians in terms of initiating new development efforts at their institutions because they had a finished show to demonstrate to their colleagues and superiors. Additionally, they had in hand research results that demonstrated the effectiveness of these shows for training users about library resources and services.

The Role of Librarians in Multimedia Production

> 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.[7]

This quote sums up the role that librarians are likely to play in future multimedia production initiatives for library-user education. Librarians want to be team leaders that manage the overall design, development, and deployment effort. Not only would they lead teams, librarians would be contributing team members—drawing on their content knowledge, organizational skills, evaluation experience, and taking responsibility for 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 would 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 among all involved parties.

Summary

The LUMENS Project demonstrated that interactive multimedia shows were effective teaching tools for library-user education content because in all three test cases, users' topic knowledge was significantly greater after visiting the sites than before. Additionally, library users took action on their own to sign up for current-alert services—that is, the particular library service or resource that was the subject of the show they evaluated.

Of the four multimedia shows that figured into the evaluation, "Doing Research" featured the most interactivity. Subjects were especially enthusiastic about the show when asked to rate its usefulness and their enjoyment using it. Over 80 percent 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.

Future instructional efforts in interactive multimedia with librarians 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 librarians' 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. Extracting librarians from the workplace and putting them into a learning environment that is solely devoted to learning multimedia production with a minimum of distractions is an absolute necessity. The content of immersion programs on multimedia production for librarians should focus on teaching skills, concepts, and knowledge that will enable librarians to lead multimedia teams in which they assign design, programming, and production to technical staff and creative staff while they bear the responsibility for content knowledge and overall project management.

Karen Markey is professor, School of Information, University of Michigan, Ann Arbor, MI; she may be contacted via e-mail at: ylime@mich.edu.

Annie Armstrong is assistant reference librarian, University Library, University of Illinois Chicago, Chicago, IL; she may be contacted via e-mail at: annie@uic.edu.

Sandy De Groote is assistant information services librarian, Library of the Health Sciences, University of Illinois Chicago, Chicago, IL; she may be contacted via e-mail at: sgroote@uic.edu.

Michael Fosmire is head, Physical Sciences, Engineering, and Technology Division, Purdue University Libraries, West Lafayette, IN; he may be contacted via e-mail at: fosmire@purdue.edu.

Laura Fuderer is subject librarian for English and French language and literature, Hesburgh Library, University of Notre Dame, Notre Dame, IN; she may be contacted via e-mail at: laura.s.fuderer.1@nd.edu.

Kelly Garrett is research specialist, CRITO, University of California Irvine, Irvine, CA; he may be contacted via e-mail at: garrettk@uci.edu.

Helen Georgas is assistant reference librarian and coordinator of instruction, University Library, University of Illinois Chicago, Chicago, IL; she may be contacted via e-mail at: georgas@uic.edu.

Linda Sharp is reference librarian, Hesburgh Library, University of Notre Dame, Notre Dame, IN; she may be contacted via e-mail at: sharp.1@nd.edu.

Cheri Smith is education and psychology reference librarian, Hesburgh Library, University of Notre Dame, Notre Dame, IN; she may be contacted via e-mail at: cheryl.s.smith.454@nd.edu.

Michael Spaly is Web applications developer, Monkeystack, Seattle, WA; he may be contacted via e-mail at: mspaly@monkeystack.com.

Joni E. Warner is coordinator of library instruction, Hesburgh Library, University of Notre Dame, Notre Dame, IN; she may be contacted via e-mail at: joni.e.warner.29@nd.edu.

Notes

1. Karen Markey Drabenstott, "Interactive Multimedia for Library-User Education," *portal: Libraries and the Academy* 3, 4 (October 2003): 601–13.
2. "LUMENS Project," School of Information, The University of Michigan, http://www.si.umich.edu/~ylime/lumens/lumens2.html (accessed July 14, 2005). The URL http://www.si.umich.edu/~ylime/lumens/lumens2.html will introduce the reader to the animation created for the site; Karen Markey et al., *The Effectiveness of Multimedia for Library-User Education: Final Report of the LUMENS Project* (Ann Arbor, MI: School of Information, 2004), 9–10, http://www-personal.si.umich.edu/~ylime/lumens/lumensfinal.pdf (accessed July 14, 2005).
3. Shelley E. Taylor and Suzanne C. Thompson, "Stalking the Elusive 'Vividness' Effect," *Psychological Review* 89 (March 1982): 155.
4. All interviews were conducted in confidentiality, and the names of interviewees are withheld by mutual agreement.
5. Response to PI by a librarian participating in the project.
6. Response to PI by Earlham College librarians.
7. Response to PI by a librarian participating in the project.