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PROCEEDINGS OF THE CONTRIBUTED PAPERS SESSION
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INTRODUCTION

Laurie Scott
Executive Director
Health Science Information Consortium of Toronto
laurie.scott@utoronto.ca

Innovative Applications of Web and Digital Technologies in Biomedical and Life Sciences Libraries.

The use of web and digital technologies has become ubiquitous in libraries of all kinds: libraries everywhere have web pages, use web-based catalogues, employ digital technologies for resources sharing and contribute to institutional intranets. While the use of these technologies is not unusual, some of our colleagues are taking them a step further, finding new and inventive ways of putting web and digital technologies to work. We invited them to tell us about the innovative ways they applying these technologies in their libraries. The response was remarkable: we received numerous submissions on a broad range of topics from all around the world. The challenge for the committee was in choosing from among the fascinating submissions we received!

The papers selected cover a wide variety of technological innovation:

- the creation, by a university medical center library, of modular web-based tutorials that allow the library to provide instruction in the use of biomedical information directly to users' desktops;
- the transformation, through digital technologies, of traditional management of document delivery and reserves in a multi-campus university library system;
- the development of a web usability study to determine the effectiveness of the re-design of an academic health sciences library home page.

These papers amply demonstrate the breadth and depth of technological innovation in biomedical and life sciences libraries today. Continuing to develop new and creative ways of implementing technologies will further allow us to improve the services we provide and increase the value those services have for our users.

In keeping with the theme of innovation, the Contributed Papers Committee has decided this year that we will no longer publish our proceedings in paper format. Instead, we will

"publish" them solely on the division web site. This move will save money and time, not to mention trees. Final proceedings will be available, in both html and .pdf formats, the week of the conference each year.

It Looks Pretty...But is it Useful? Testing the Usability of a Library Home Page

Heather Munger, Reference/Instruction Librarian
Health Sciences Library, State University of New York at Buffalo
hmunger@acsu.buffalo.edu

Pamela A. White, Electronic Resources/Reference Librarian
Health Sciences Library, SUNY Upstate Medical University
whitep@upstate.edu

Introduction

In the spring of 2000, the staff at the Health Sciences Library, University at Buffalo (HSL) determined that the library's first generation Web site needed a complete overhaul. The Web site was attractive and well organized, but did not provide intuitive access to library resources or services. A revitalized Web team was charged with the task of redesigning the site to better meet the needs of health sciences students, faculty, and librarians.

Usability should be introduced at the very beginning of the redesign (or creation) of a Web site and revisited throughout the development process. A usable Web site ensures users are able to complete tasks easily and efficiently. "Characteristics that all usability testing share are: the primary goal of improving the usability of the product; participants represent real users; participants do real tasks; observe and record what the participants do and say; analyze the data, diagnose the problems, and recommend changes; and, results are used to change the product and the process" (Dumas and Redish 1994).

Redesigning the Web Page

The "HSL Web Group" was a loosely structured team of professional librarians with an interest in Web page design that met only when changes were needed. The group included reference librarians, whose primary focus was the usefulness of the page for finding internal and external health related resources, as well as librarians from various other departments, whose focus was to assure that library services were readily apparent. Eight librarians volunteered to participate on the redesigning team.

An informal needs, user, and task analysis was performed based on the Health Sciences Library staff and primary clientele -- faculty, students, and staff of the Schools of Medicine and Biological Sciences, Dental Medicine, Nursing, Pharmacy, and Health-Related Professions. The consensus was the content was comprehensive and the site was visually appealing, but users had to search through too many "layers" to find information -- and even the reference librarians sometimes had trouble finding information on the site. The use of library jargon was another barrier.

Jakob Nielsen is a leading usability expert who has published numerous books and articles on the topic. For the redesign, the HSL Web Group utilized his theory of usability. Nielsen's "know the user" approach was used to complete the user and task analysis. "Know the user" consists of four components: individual user characteristics, task analysis, functional analysis, and evolution of the user (Nielsen 1993).

Awareness of the users' characteristics make it possible to anticipate learning difficulties and to better set appropriate limits for the complexity of the user interfaces. User characteristics include work experience, educational level, age, and previous computer experience (Nielsen 1993). At HSL, the users are generally knowledgeable about the subject matter, but may be less knowledgeable about technology. It is important for them to have access to recent clinical information and research studies in a reasonably short period of time. Many users do not have the time to learn a complex system or to search through numerous "layers" to find information.

Task analysis is the second component of "know the user." The Web site is used for access to the library's catalog and bibliographic databases, for information about the library's collections and services, and for information beyond the library. "The users' overall goals should be studied as well as how they currently approach the task, their information need, and how they deal with exceptional circumstances or emergencies" (Nielsen 1993). When helping patrons at the reference desk, reference librarians have the opportunity to observe how users interact with the Web site. Observing users performing tasks reveals the Web site's strengths and weaknesses. Identifying the weaknesses provides opportunities for improvements for the new Web site.

The third component of "know the user" is functional analysis. To improve the performance of the Web site, librarians needed to look beyond how users were currently performing the task and consider the functional reason for the task.

Evolution of the user is the fourth component of "know the user." Some users will become proficient with the Web site and will expect shortcuts or accelerators. As Nielsen states: "It is important not to design just for the way users will use the system in the first short period after its release" (1993). Librarians wanted to incorporate direct access to the resources for experienced searchers along with descriptive categories to guide novice users to the appropriate resource.

The task force members then examined the architecture and usability of other academic health sciences libraries' Web sites. Sites were chosen either by their popularity with librarians or by their uniqueness. The librarians noted such features as:

- Organization, clarity and readability (including page layout and use of color)
- Accessibility (including the need to drill down to lower level pages to access data or sources of data)
- Use of pictures and graphics (including time required for pages to load), and
- Special features, such as express or quick links.

The review generated many creative ideas. A brainstorming approach was used to identify information that needed to be included on the top-level page and to set parameters for page design. The task force decided on the following approach:

1. The main body of the Web page would consist of broad general categories, with links to more specific information from the top-level page. The goal was an organized, easily readable page that would direct inexperienced users to the appropriate resource while promoting accessibility by limiting the need to link to lower level pages. Four categories were selected: Library Basics, Collections, Resources and Services.
2. A "Quick Links" section would be developed as an accelerator for experienced searchers.
3. The combination of a "main section" and Quick Links would result in link redundancy, but also would allow for the use of varied terminology to improve navigability (e.g., "Biomedical Databases" in Quick Links and "Find a Health-related Article" in the main section).
4. The use of graphics or images would be limited so that the page would load rapidly and could be easily revised and updated.

Librarians and technical staff took the committee's recommendations and developed a prototype of the new Web site. The next step would be to test the design to verify that it was as "usable" as the task force expected.

Usability attributes

A usability attribute is defined as "the general usability characteristic to be measured for an interface" (Hix and Hartson 1993). Common usability attributes are:

- Learnability: the ability to successfully complete a task in an appropriate amount of time (Hix and Hartson 1993; Nielsen 1993; Rubin 1994);
- Memorability: not having to relearn the Web site after a period of non-use (Nielsen 1993);
- Initial performance: the user's performance during the very first use (Hix and Hartson 1993);
- Errors: if a participant does not accomplish the desired goal while performing some specified task it is considered an error (Nielsen 1993);
- Advanced feature usage: ability to use shortcuts or accelerators (Hix and Hartson 1993);
- Satisfaction: how pleasant is it to use (Hix and Hartson 1993; Nielsen 1993)

Usability attributes are chosen based on intended users of the Web site and the tasks they will perform (Hix and Hartson 1993). The Health Sciences Library considered learnability, errors, advanced feature usage, and satisfaction as usability attributes for the redesigned Web site.

Usability Testing

Participants

According to Nielsen, a small sample size is sufficient to identify trends and problems with Web page design (2000b). The team decided to observe ten library patrons. Since the goal was to design a page that was easily usable by any patron, the team decided that the sample should consist of users familiar with the World Wide Web, but not necessarily expert in using library Web pages. Students would be a natural group to observe, but because testing would take place during the summer when library use decreases, random selection of students could have delayed the testing. Therefore, it was decided to use a convenience sample of students – the circulation department assistants. Although familiar with the library, these students had no special training or expertise in using the library's Web site to locate information or sources. Volunteers who agreed to participate could complete the test during their normal working shift.

Study Design

A subcommittee of three librarians was charged with the task of developing both a protocol and tool for testing the Web page design. Based on a review of the literature and previous experience in testing Web pages, the team decided to conduct an observational study using a paired interview technique. Two librarians would participate in each interview. One librarian would act as the moderator, asking questions and providing direction; the second would act as an observer. The University Libraries committee had developed a questionnaire to evaluate new Web pages and a method of tracking responses to identify common problems and errors. The questionnaire had been designed to assess the Web usability for various library functions and services. Each question had been evaluated to determine the most effective path for a user to follow when finding information. This tracking methodology allowed the researchers to identify if subjects selected correct choices, which links were unclear, and the patterns used to find information. The team decided to adapt that tool and methodology to test the functionality of the new Web site

Data Collection

The final tool consisted of 11 closed questions concerning library resources and services. The questions were representative of those typically asked by patrons and were written to deliberately avoid library terminology. They covered a wide range of library information, both research-oriented and directional (Appendix A). Along with the tool, the team developed a pathway leading to the correct response and suggestions the moderator could use to redirect a participant who was truly lost – without giving the exact answer.

All questions could be answered by using the library's Web site. Links to the correct responses were found within one of the four major categories in the main body of the page; many questions could alternatively be answered using the "Quick Links" box. Although to fully answer some questions the student would need to search a database or the library's catalog, the goal of the test was to determine if the top-level page was usable. Therefore, an answer would be considered correct if the patron selected a link that would ultimately lead to the appropriate database or catalog.

Guidelines were established to standardize the testing process (Appendix B). The moderator would ask the questions in order and give participants as much time as they needed to answer. Once students felt they had reached a satisfactory result, the moderator would accept the answers and proceed to the next question, even if the response was incorrect. The moderator would not direct students toward particular answers, but if asked, could suggest that a student try again, or look in a different section of the page. If the participant failed to find the correct link after three attempts, or seemed frustrated, the moderator would proceed to the next question.

In order to facilitate open communication, students were asked to explain their thoughts as they searched the page. Thinking aloud, a technique extrapolated from Nielsen, would help the observer to understand how the student was using the page (Nielsen 1993). Emphasis was placed on the idea that this was a test of the Web page and not the student, and that the goal was to determine the usability of the page, not the student's ability to answer the questions.

Ten students were tested over a period of one week. Upon completion of all interviews, responses were analyzed to identify terminology or links that were unclear or cumbersome. The results were compiled and presented to the task force to determine if modification of the page was indicated.

Results

Because of the small sample size, the team evaluated the total number of responses (110) in assessing the overall effectiveness of the Web page. Seventy-six percent of initial responses were correct. Only 14% of the total number of questions asked were unanswered after two attempts.

The team also analyzed the test questions for trends or problems. All participants found the correct link for nine of the eleven questions. For six of these questions, 90% found the link on the first try.

Only two questions indicated potentially significant problems. One question asked participants to find information on library classes. The correct link was labeled "Library Instruction." While seven of the ten of the participants found this link immediately, one gave up and a second found it only with prompting. Both of those students stated they did not relate the term "instruction" to library classes.

The second question highlighted several potential problems. Students were asked to "find another Western New York library" that owned a certain book." The correct link was labeled "WNYNet" and was located only in Quick Links, not under one of the four major categories in the main section. To answer this correctly, the students would need to know that they should look in a catalog, and that the name of the union catalog for western New York libraries was WNYNet. Of the first six students tested, two never found the link. The remaining four found it only after being directed to look at Quick Links, and after

ruling out all other choices on Quick Links. Realizing there was a definite trend; the link was relabeled "WNYNet Catalog." After the change, 75% were able to find the link on the first or second try, although one still required prompting to check Quick Links.

This question illustrates two potential problems. Links that require knowledge of a name or title have the potential to be unclear. Secondly, locating this link only on Quick Links reinforced the need to know the jargon, since it "stood alone" without the benefit of being listed under a category that might provide some direction. Lastly, not all participants may realize the purpose of the Quick Links section and may not think to look there. All of these factors might contribute to frustration for users unfamiliar with the page.

The findings for two questions that were answered successfully were also interesting. When asked to find a journal article, not one participant chose "Biomedical Databases" located within Quick Links. All instead selected the link labeled "Find a Health-related Article." Another question asked students to "send a question to a librarian at HSL." All participants answered successfully, nine out of ten on the first try. The team expected that participants to chose the link labeled "AskHSL" (an established email reference service) located in both the main section and Quick Links – but half bypassed the direct link and chose "Reference Assistance," which eventual did lead to "AskHSL." These questions again illustrated the potential problems of using jargon or library terminology and confirmed the importance of link redundancy (with varied terminology) to make pages more accessible and navigable.

Conclusion

The team realized that librarians and students used the page differently. The librarians tended to look at Quick Links for the most direct access – and assumed other users would do the same. The study participants fell into one of two categories. Some students scanned the entire page, while others systematically reviewed each category. With both groups of students, the use of Quick Links was secondary, and they looked at that section of the page only after they couldn't identify an appropriate link in the main section – and sometimes only with prompting. However, once the participants "found" the Quick Links, they often checked there first when answering subsequent questions. This proved the use of Quick Links as an accelerator (or advanced feature) to be effective.

The informal needs, user, and task analysis was effective in determining why and how to redesign the Web site. Reviewing other health sciences library's Web sites provided ideas for navigation, terminology, and information architecture.

Conducting the study with a small sample size was advantageous. It was cost effective and efficient. With each participant new errors were identified and after the first few participants a pattern of common errors started to emerge.

Asking study participants to think aloud as they answered the questions was invaluable. Students verbalized why they selected certain links as well as why they were not choosing others. This enabled the observer to better understand which terminology

"worked" and why other links were confusing. Besides the terminology obstacle, the learnability of the Web site was a success.

Results of the usability testing verified the design changes had the desired effect: improved usability and more direct access to resources and services. The method of usability testing utilized by the HSL librarians garnered information from users that otherwise would have been unavailable to them.

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Appendix A - Web Survey Questions

1. What are the Library's hours for Fridays?
2. Find the title of an electronic journal?
3. Find a book on the subject of Nursing that is owned by the UB Libraries.
4. Locate a journal article on heart disease.
5. Locate two Internet sites on Consumer Health.
6. Find information on Library classes.
7. Locate the form to request a book through interlibrary loan.
8. Find another western New York library (besides HSL) that owns the book *Harrison's Principles of Internal Medicine*.
9. Send a question to a librarian at HSL.
10. Who is the Director of the Health Sciences Library?
11. How would you renew a book through the Library's web site?

Appendix B – Survey Guidelines

Participant Greetings and Instructions:

Thanks very much for agreeing to help us test our Web site. We are in the process of redesigning the site and we want feedback from the user's perspective. THERE ARE NO RIGHT OR WRONG ANSWERS – we want to learn why you make the choices you do.

Here is how the test will work:

- You will be asked a series of 11 questions that can be answered using the new Library home page.
- Take your time while answering. If you want to start over while working on a question, use the HOME button to return to the main page.
- Please walk us through your answers. Explain what you are thinking while you are working. This "thinking aloud" process will help us to understand how you are using the Web site so we can make improvements.
- You may encounter questions you won't be able to answer. If that occurs, you can stop and move on to the next question.
- Always return to the HSL main web page before you start each question.

Remember, we are testing the web site – NOT you.

Guidelines for the Moderator:

- Never indicate that a subject has made a mistake.
- For every question, if subjects feel they have reached a satisfactory result, even if it is one that you do not consider to be correct, accept that answer and go to the next question.
- If a person becomes sidetracked, suggest starting over and trying again.
- If subjects seem uncertain, it is acceptable ask them what they are thinking ("think aloud") and to give general prompts.
- If the person seems frustrated and not close to a satisfactory answer, suggest going on to the next question.

Electronic Document Delivery in West Virginia

Nancy J. Wasson, MLS
Head, Access Services
West Virginia University Libraries/Health Sciences Library

Carroll W. Wilkinson, MLS
Head, Access Services and Depository
West Virginia University Libraries/Charles C. Wise, Jr. Library

DIGITAL DOCUMENT DELIVERY AT THE HEALTH SCIENCES LIBRARY

Background

The Health Sciences Library at the Robert C. Byrd Health Sciences Center at West Virginia University is an active participant in Interlibrary Loan/Document Delivery. Constituencies at the HSL include on-campus faculty, staff, and students and also off-campus users. Those off-campus users include rural health education rotation students completing their field assignments; distance education students at several sites within the state; clinical/field faculty in various health care settings; health care practitioners throughout the state; and, in fact, anyone needing health care information. Traditional formats for providing requested documents have included photocopies, either sent via US mail or available for pickup at the circulation desk of the library, and facsimile transmittals. Fax machines became popular in the mid-1980s. (Webopedia) Although fax *is* a digital method of delivery – images are sent or received over telephone lines – the images are generally of poor quality. In addition fax/telephone lines are frequently busy, and many individual users do not have access to fax machines. With a need for timely information comes a demand for rapid delivery of that information. Newer methods of digital document delivery now offer faster delivery of information.

The HSL has utilized Ariel® transmission of journal articles between libraries for a half dozen years. Ariel® is document transmission software developed by the Research Libraries Group. (Ariel FAQs) Since both a sending and receiving station are necessary, Ariel® is generally considered to be an interlibrary method of electronic delivery. In 1998, in an effort to continue rapid delivery of requested information, ILL staff began forwarding these bit-mapped images/TIFF files as e-mail attachments to several users' desktops. An image or TIFF viewer such as the National Library of Medicine's DocView was required in order to "read" the document. (NLM) In addition, sufficient mailbox capacity was required. One faculty at the Health Sciences Center recounted that his department didn't allot sufficient space on the department's server for regular e-mail correspondence; receiving large document files would be out of the question.

New Technology/New Services

Recently, improvements in transmission options have taken place. PDF or portable document format files have a number of advantages over TIFF files. (Adobe Acrobat) Adobe® PDF files can be compressed so that files download quickly; preserve the original appearance of the document; and may be viewed using Adobe Acrobat Reader, a free viewer. (Adobe Acrobat) An important copyright concern has also contributed to the fact that Adobe® PDF is now the standard for electronic document distribution. While TIFF files are editable and can be altered, PDF documents, when opened using the free Acrobat Reader, cannot be altered or manipulated.
In an effort to provide easily accessible electronic documents, the HSL partnered with WV CONSULT, affiliated with Rural Health at the Health Sciences Center, and, in 1999, began offering digital document delivery to a select group of users: WV CONSULT Gatekeepers and RHEP (Rural Health Education Partnerships) site coordinators. (*Online with WV CONSULT*, 1999) Minimum hardware/software requirements included the following (Wasson and Wilkinson, 2000):

- Windows 95 or Macintosh 6.5
- 28.8Kbps Modem Internet Connection (56Kbps recommended)
- Microsoft Internet Explorer 4.0 or Netscape 4.0
- Eudora 3.0, MS Outlook 97, MS Outlook/Outlook Express, or Netscape Messenger 4.0
- Adobe Acrobat Reader

ILL/Document Delivery staff process documents in a series of steps: scan the article, convert the document to PDF using Adobe Acrobat software, FTP to the WV CONSULT server, choose the correct e-mail template, insert the naming convention, and e-mail the user. The URL is contained in the body of the e-mail. Access to articles is userID and password protected. Authorized userIDs are sent to WV CONSULT as new users are added. In addition, in an effort to be copyright compliant, manual removal of the documents from the server takes place every week.

Preliminary Results

End users have reacted positively to the Health Sciences Library's new web-based Digital Document Delivery service. Those Gatekeepers/Site Coordinators who have requested articles owned by the WVU HSL and who have received those articles electronically continue to request electronic information delivery. Articles are stored on the WV CONSULT server, thus not tying up server space on the user's provider's end. Staff find scanning convenient using the Minolta PS3000 open face scanner; it is no longer necessary to first photocopy the article as is required when sending by fax.

Collaborative efforts included funding, partnerships, and staff development. The HSL purchased the open face scanner at a cost of $9,237.00, the necessary software (Adobe Acrobat approximately $249.00), and a hard drive ($400.00) for its support server. WV CONSULT provided server space as well as management of the user base. Collaboration between the Health Sciences Library and WV CONSULT proved to be a logical partnership since both units have a similar mission: to provide WV health care

professionals and students improved access to timely biomedical information. The WV CONSULT Director and Associate Director along with library faculty publicized the new service to WV CONSULT constituents via newsletters (*Online with WV CONSULT*, 1999), listserv email messages, and instructional sessions at the WV CONSULT Gatekeepers Conferences. (Wasson, 1999) HSL Interlibrary Loan/Document Delivery staff learned new skills in order to provide electronic document delivery in addition to providing instruction/ information to those statewide users anxious to access documents electronically.

Digital document delivery is fast, convenient, a sought-after service as users take advantage of increased Internet availability and their improved individual skills in using online resources. The HSL was confident that our user base would continue to grow; we fully expected to see an increased demand for electronic information delivery whether the library owned the document or not; we believed users would eventually expect digital document delivery whether across campus or across the state. Our user base has expanded to include the rural health education rotation students completing their field assignments; distance education students at several sites within the state; clinical/field faculty in various health care settings; health care practitioners throughout the state; and commercial clients. We anticipate on-campus electronic document delivery to become an even more popular library service. In fact the distinction between ILL and document delivery is becoming more blurred. Whether the home/provider library owns the document or whether that library must secure the item from another source is of no concern to the patron. S/he simply wants the information as soon as possible. The Health Sciences Library provides free Interlibrary Loan services to current faculty, staff, graduate and undergraduate students. Document delivery of those materials owned by the HSL is a fee-based service. With the exception of the rural health education rotation students, the HSL charges for document delivery whether web-based electronic, fax, or print. Charges vary based on affiliation and category of user, e.g. WVU affiliated users; non-affiliated health care practitioners (includes hospitals/clinics); academic, public, and government libraries, both in-state, out-of state, and international; and commercial clients.

Continued Enhancements

As new technological advances have become available, we have seen continued improvement/refinement in how we provide electronic information delivery. Prospero software developed by staff at the John A. Prior Health Sciences Library at the Ohio State University, captures/converts Ariel® files to PDF documents and automates a number of steps in providing electronic document delivery services. (Prospero) Relais Express commercial software offers even more flexibility in providing multiple delivery options. (Relais International) Ariel version 3.0 with an expected release date of spring 2001 will incorporate Prospero functionality and will offer other new features similar to Relais Express. (Ariel®)

The ILL/Document Delivery department at the HSL began experimenting with Prospero software in fall 2000. An article received as an Ariel® file is automatically converted to

PDF and saved on our West Virginia University Libraries server. Staff select the end user from the patron database. Patron information must be entered only once. An email is automatically sent to the patron who is able to access the document using a randomly assigned Personal Identification Number. It is no longer necessary to assign individual user IDs and send that authorized user information on to the unit maintaining the server. Nor do ILL/Document Delivery staff have to send individual e-mail to those requesting electronic articles. For journals owned by the HSL, the article is scanned and, again using Prospero software, converted to a PDF file and sent as a web-base document. During the month of January 2001 the HSL sent 70% of all ILL requests received electronically on to the users desktop (407 articles) using Prospero software. 85% of documents (519 articles) loaned by the HSL were sent electronically using Ariel®, Prospero, or our homegrown digital document delivery system. (ILL Monthly report, January 2001) Prospero as a free open-source system is, of course, extremely attractive as many libraries are being forced to downsize budgets as users demand more services. The creators of Prospero have made a significant contribution to ILL/Document Delivery units everywhere. (Schnell, 1999) We are anxious to test the new Ariel version 3 which incorporates features for end-user document delivery since we currently utilize Ariel® software: $495/copy for the upgrade vs. $2,000/copy plus a yearly maintenance fee for Relais Express.

Future Expectations

We will continue to explore what is being used elsewhere as well as stay abreast of any new commercial software developments. As the land grant university of the state as well as a Resource Library within the National Network/Libraries of Medicine, our responsibilities at West Virginia University's Health Sciences Library are myriad: service to our academic users, service to the state, service to anyone needing health care information anywhere. We look forward to continuing to expand our digital document delivery services to our many and varied library users. Electronic information delivery is, indeed, no longer the wave of the future but a service deemed essential by our Health Sciences Library users.

Endnotes

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UNIVERSITY LIBRARIES ELECTRONIC RESERVES

Introduction/Definitions

Document delivery is a term that is used today in many types of libraries to mean several types of services. In a commercial sense, document delivery is a service that allows a user to order copies of materials (usually journal articles) from sources outside the library. Users pay for this service. It also means *information available electronically from a secure site to support an educational purpose*. This second definition is inclusive of electronic reserves in an academic library setting. It is closely related to interlibrary loan service in this manner of thinking. Here the user does not pay for the service. It is included in the library's information outreach and support efforts. Often reserves, a traditional form of library support to faculty and students in an academic setting, are not considered in definitions of document delivery, though a case could probably be made that even traditional reserves ARE a form of document delivery. This paper takes the view that electronic reserves are definitely another variation on the theme of the timely and highly popular document delivery services that libraries offer and many commercial services sell.

Background at West Virginia University Libraries

In the 1990's, academic libraries in the United States and other English speaking countries began to transform traditional reserve service into in electronic reserve services. In higher education environments many college and university libraries are now delivering information electronically to students on behalf of their faculties. At this time in 2001, there are at least 138 known institutions offering electronic reserve services. (Rosedale). West Virginia University Libraries is one of these institutions. Since 1998, starting first with a pilot project on non-copyrighted materials and then quickly expanding in 1999 to include all needed materials at our Downtown campus library site, we have supported the instructional efforts of faculty with electronic reserve service. This was an expansion of what we have always done since the 1930s through reserve service. We simply added the use of new technologies to broaden and enrich an established service. In the words of Jeff Rosedale of the Electronic Reserve Clearinghouse, "Bringing electronic information technologies to bear on this process offers an opportunity to remove not only physical barriers but also temporal limitations of access during library hours. Electronic media allow for a more interactive learning experience as well as the addition of sound and motion to make course related materials more engaging." (Rosedale)

At present University-wide, 200 WVU faculty members have chosen to use electronic reserve services, while 441 use traditional reserve services. The materials the faculty members place on electronic reserve vary greatly from discipline to discipline and include tests, lecture notes, homework solutions, journal articles, research reports, book chapters, and PowerPoint presentations. One way or another these materials are "documents" and when the materials are digitized and transmitted to a secure library site for study and possible reproduction, it is indeed document delivery. (Wasson and Wilkinson)

Designing a Homegrown E-Reserve/Document Delivery System for a University Library

The next section of this paper explores the some of the key issues and concerns we encountered at West Virginia University Libraries in setting up a homegrown system for delivering documents through electronic reserve services. They include:

- project approval and funding
- software/hardware identification, selection, and maintenance
- collaboration with Systems, web development, other campus libraries
- consideration of commercial products for e-reserves management
- virus and crash management
- responsible copyright observance in a fair use environment
- faculty user education about integration of e-reserve in course planning
- student user education and surveying satisfaction
- migration to a new system
- the campus politics of printing and copying digital materials
- staff challenges

Project Approval and Funding

Surprisingly, this was the easiest part of the implementation. The Provost of our University had traveled to other campuses and had observed e-reserves in action. He wanted such services in our libraries. Following the writing of a project proposal with a reasonable budget, he reviewed it and invested $30,000 in start-up costs. This allowed for the purchase of a server and public service user equipment for dedicated e-reserve stations. Our Libraries' Dean supported other equipment purchases and start-up costs. Our first scanner was a flatbed model for which we quickly purchased a document feeder attachment due to the rising popularity of the service.

Software/Hardware Identification

We reviewed software that accomplished the tasks that were needed and decided upon WS FTP, Adobe Exchange, Reader, Acrobat and PageMill. Our Systems staff recommended hardware that was durable, contained enough memory, and offered scanning speed that expedited document processing for digitization. We have found that

it is essential to monitor software/hardware upgrades and changes in the marketplace so that within reason, we can be as up to date as possible. (See requirements for Hardware/Software at http://www.hsc.wvu.edu/library/docdel-poster.htm)

Collaboration with Systems, Web Development, Libraries

When using new technologies to offer old, redesigned library services, nothing is more important than collaboration. Why? We are human beings of different ages, races, and backgrounds working together in a shared environment that changes every day. Each of us has knowledge; none of us knows everything. We have to work together. We must learn from each other. These days no new library service survives without a web component and certainly not without Systems support in choosing and maintaining software and hardware. In decentralized systems such as ours, unless branch staff cooperate, services cannot be offered effectively to all constituencies served by the Libraries' system.

Commercial Products?

The commercial marketplace offers several products that "do" electronic reserves and we have reviewed one of them in particular: the Docutek product ERes. But our homegrown system works well for us now and we have not been able to justify the expenditure because we have not yet seen enough advantage to switching to a commercial product. This may change in the future.

Copyright

Copyright compliance requires that librarians monitor the changes in the law at the federal level and integrate them into library policy. These changes need to be shared with the faculty users of electronic reserve services. It needs to be said frequently that copyright is a complex and contradictory subject. But copyright educator is a good role for the librarian. There is a lot to teach about operating in the fair use environment and making the most of the rights we do have.

User Education-Faculty and Students

To promote the use of e-reserves services by faculty, my staff and I designed a two-hour course in 1999 that has been offered most semesters through a seminar series on faculty development run by the WVU Academic Affairs Office. The course is called "Integrating Electronic Reserves Into Your Class Planning". We have had at least forty faculty take the course and evaluate it positively. 200 faculty members are using our electronic reserve services at this time. Between 7 and 18 faculty members have taken this course each time it has been offered.

Students who have taken courses in which e-reserves were used are good advocates for further use of electronic reserves with faculty. They function as library service promoters in this regard. At first through a user satisfaction survey, we discovered that there were

students who liked e-reserve services, and there were many who did not. Students loved being able to read their assignments at home or in the campus computer centers rather than being required to come to the libraries. Dissatisfactions grew out of frustrations with their providers and the printing equipment that caused printing time to vary greatly. In the last two and a half years we have seen a dramatic transformation in acceptance of electronic reserves by students. We attribute this in part to more widespread use of Windows 95, 98 and 2000. AOL has also started allowing file sharing as part of its regular service. Smaller providers have followed suit and that has opened up faster and more trouble-free document transfer service to many of our students. The one remaining problem seems to be the occasional student who does not realize that Adobe Acrobat Reader must be installed on his/her personal or home computer and that downloading it is not enough. The installation procedure must be followed as well. Some expect that this will take only a minute or so to do the download and installation, but it is at least a twenty-minute procedure and that is a lifetime to some students.

Migration to New Systems

West Virginia University Libraries were a NOTIS Library until May of 2000. At that time, we migrated to Endeavor's Voyager. In both systems is has been our experience that the reserves function outside the mainstream of the basic automated library system. Reserve and the rest of the system work in parallel formation; they are not really integrated in the way we understand integration of cataloging and circulation functions for example.

Printing and Copying Politics

At this time, all the WVU Libraries except one are absorbing printing costs in full. The Associate Provost has a blue ribbon panel exploring the efficacy of charging consistently for printing in our academic computing labs and in our libraries across campus. The Libraries are hopeful that a cost recovery system will be adopted by the Administration so that students will pay for their own copies in the future.

Virus/Crash Management

Many faculty members submit their materials to us through e-mail. In turn, some of them take materials from the Internet. As a result, we have had two unfortunate experiences with the introduction of viruses in electronic reserves. This has been a temporary setback each time and we have worked together with our Systems people and the effected faculty and students to rebuild the infected files. We have always had virus protection but now the use of Norton Anti-virus software has been much more effective than earlier programs.

It is our conclusion that an attitude of complacency toward viruses is unwise in e-reserve operations. We have found that it is easy to underestimate the negative effects of an infection, no matter how small. There is significant disruption to both student learning

programs and faculty class planning. Investment in the best protection is well worth the cost. Staff need support in how to identify and report an infected file.

At the time of the introduction of a new server configuration, we experienced one total system crash. Luckily most of the files were backed up so we were able to rebuild our documents. However some files had to be completely re-scanned. Such a thing only needs to happen once to open everyone's eyes to the seriousness of a crash and its effect on service.

Staff Challenges

Experience since 1998-99 at West Virginia University Libraries has taught that some staff in access services do extremely well when faced with doing reserves in both traditional and nontraditional formats. Others feel fearful, but willing to learn. Others must be cajoled. In some cases, it must be made clear through new performance expectations that learning how to do e-reserve processing is non negotiable because change is here to stay. Supervisors may encounter differences in technical ability, problems in work flow and work assignments, and a need for training and re-training. Technological change requires the establishment of positive attitudes toward continual learning. All access services staff must eventually have e-reserve skills but achieving that does not happen for all employees at the same rate of speed. Tensions can result from differences in ability and it is a supervisory necessity to intervene and modify these as promptly as possible. Interventions can include retreats, workshops, individual conferences, revisions of job descriptions, and clear goal setting with performance evaluations. Good personnel management with firm but patient skill development for all employees (including librarians!) throughout the implementation of electronic reserve services is critical to success.

Conclusions

No e-reserve service in an academic library can operate in a static setting. It is affected by changes in the larger library environment and must change continuously to keep pace with needs as presented. Through e-reserve service, an academic library can offer library service to previously unserved users, it can provide new convenience to users, it can teach new Internet skills that are adaptable to many different educational settings, and it can be an additional component in efforts to offer virtual library services. No electronic reserve service is developed on any campus without real applications of interdepartmental collaboration. Often the campus departments that must cooperate include: the Provost's Office, the Office of the Dean of Libraries, various relevant department heads within the Libraries, the Libraries' System Office, the Web Development Librarian and all of the front lines staff members who process materials for reserve and work directly with the faculty and students. Whoever is on the libraries' team, the information odyssey in search of document delivery implementation is well worth the commitment and effort.

Endnotes

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http://www.dartmouth.edu/~biomed/workshops/augment.html

Development of Web-Based Tutorials Utilizing a Case-Based Approach to Biomedical Database Searching and a Reusable Electronic Tool

Jennifer Lyon, John Clark, Annette Williams, Rebecca Jerome,
Kimbra Wilder Gish, Nunzia Giuse,
The Annette and Irwin Eskind Biomedical Library, Vanderbilt University Medical Center

Introduction

With the exponential increase of new information in medicine, including such key clinical aspects as diagnosis and treatment, health care professionals require efficient and timely access to published information. Educating clinicians in searching for relevant information continues to grow in importance. While biomedical libraries frequently provide training of some type, new methods of information delivery require librarians to approach this need in new ways. Based on the Eskind Biomedical Library's (EBL) commitment to provide the finest and most accessible training possible to Vanderbilt University Medical Center faculty and staff, we now provide modular tutorials (knowledge modules) created to deliver 24-hour remotely accessible instruction to our primary users. The project goals are to

Deliver digitally based instruction on EBL resources to remote users.
Develop a reusable electronic tool that will facilitate further instruction and provide a consistent framework for our web-based instructional materials.

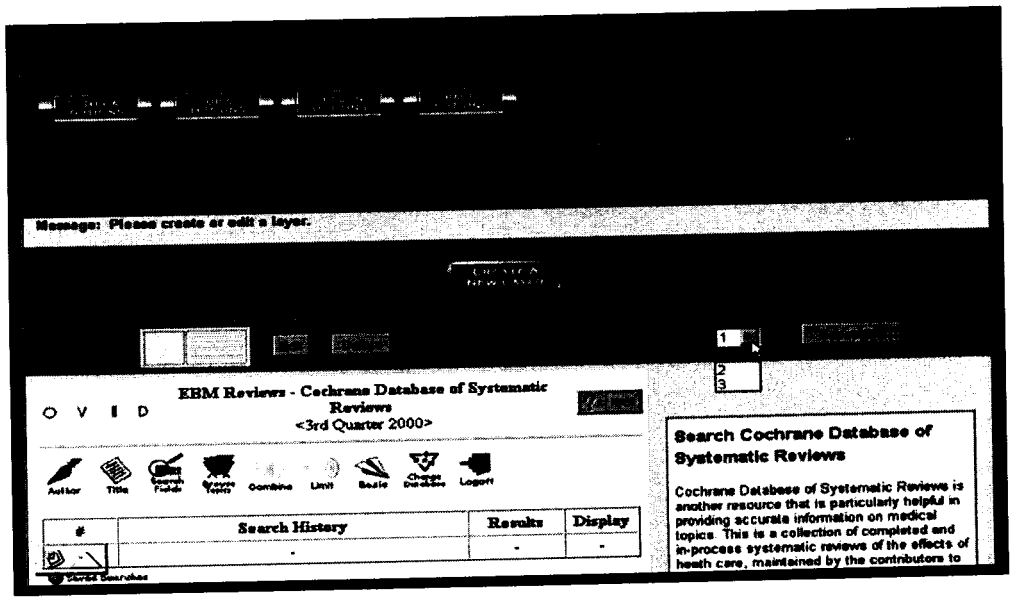
The concept of reusability is important, as it leverages on previous accomplishment, conserving additional resources. As the EBL web team recently developed a web-based interface for a pathology teaching tool (VIRGIL) developed with the Department of Pathology and utilized by Vanderbilt Medical School's second-year students, we recognized the potential of several project elements as framework for designing a flexible training tool. A team comprised of web development staff and librarians from Knowledge Management Services collaborated to address the possibilities.

The three primary elements of the project include creation of a content entry (administration) tool, a standard developer display, and appropriate instructional content. In addressing these requirements, we faced a number of challenges. Close communication between trainers and web team is essential for successful translation of content into an appropriate and useful design, requiring frequent meetings and working discussion groups to propose, evaluate, and revise multiple design formats. Basic requirements for the modules include a non-static, reusable system, extensive editing capability, ease of navigation, and a balance between customization and standardization. During the development phase, we frequently returned to the use of existing code and design features from the VIRGIL project to meet challenges and leverage on existing work. This proved the validity of the concept of reusability.

Entry (Administration) Tool

The content entry tool was designed to be a password-protected internet-accessible resource, allowing multiple individuals to use the tool simultaneously while permitting tutorial access only to the creator. This tool feeds material into a database through the use of templates, using a modular and hierarchical structure so that the user can manipulate several layers: tutorial, topic, lesson, page, page layer. Each level is clearly identified. Buttons promote ease of navigation. Each level can also be easily edited, renamed, re-positioned, or deleted.

Developers enter all content into the Page Layer level using a set of preformatted templates designed to allow for various placements of text, graphics, quiz questions, and multimedia. For each text box, the developer can opt to place a box around the content. In addition to plain text, the tool accepts HTML code and Javascript. This allows experienced developers to create more advanced displays while allowing success for the less-experienced as well. Graphics are uploaded and stored in the underlying database; these can be automatically set as links using a test template. The quiz structure allows developers to enter the question, the correct answer, four incorrect answers, and text responses to each choice. This allows for explanations of why a given answer was incorrect or correct. Once the developer has entered all content into the template, the system automatically generates the display. Developers can edit any content by simply clicking the edit button – all changes are instantly added to the display upon reload.

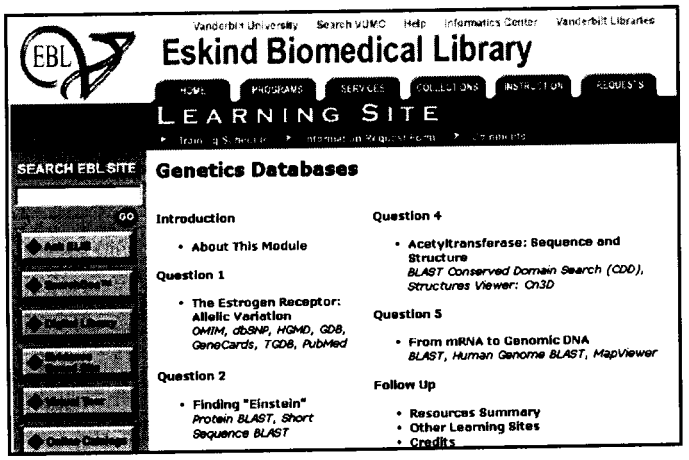


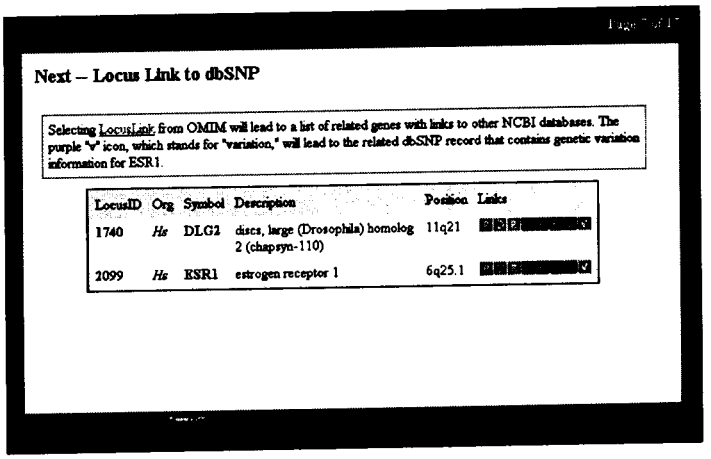
The User Display

Key requirements for the user display include consistency and ease of navigation. The overall look of the display was adapted from the VIRGIL project, presenting content in a

central frame with colored side frames containing navigation buttons and location information. Buttons labeled Next and Previous allow the user to move forward and backwards within the knowledge module. Another button allows immediate return to the table of contents (TOC) for the tutorial. The TOC contains a structured view of the tutorial contents with links to all lesson sections. Therefore, users can choose to view the entire tutorial sequentially or link instantly to internal sections.

The color of the side frames, font sizes and styles, and several other display features can be manipulated through the 'edit tutorial' option in the administration tool. This feature allows an experienced developer to upload style sheets to adjust the look of the individual tutorial. Defaults allow inexperienced developers to create a consistent and attractive tutorial without knowing how to write the code for a style sheet.





Module Content

Our fundamental approach to the development of instructional content is contextual and case-based. EBL-provided user education, whether classes or knowledge modules, introduce resources within the context of specific questions, using them to demonstrate and train in multiple resources. Sample user questions, commonly actual questions received by EBL librarians within the clinical or research setting, are discussed in detail and serve to demonstrate the process of finding the answer. This approach positions resource instruction within the context of practical user needs and provides examples of common types of questions.

The key features of this case-based approach address several objectives in user training, including

Analysis of the components and context of a clinical or research question.
Selection and combination of relevant search terms.
Recognition of the strengths and weaknesses of different resources.
Evaluation of results retrieved.

Modules include quizzes and practice questions; a link to a librarian-provided answer accompanies each practice question, allowing users to compare their chosen strategies with an expert strategy. Both demonstration and practice questions provide models which users can use in addressing new queries of a similar nature.

The first module provides a broad overview of searching the biomedical literature. Five questions are included; EBL librarians received three of these during clinical rounding. The remaining two were selected to illustrate specific types of questions related to molecular biology research and public health statistics. The introduction addresses basic concepts of database structure, analysis of the components of a question, choice of resources, and evaluation of results. A summary of all resources mentioned in the question-based sections, including their strengths and weaknesses, appears in the conclusion, accompanied by a set of practice questions. EBL developers continue creating new modules which focus on specific resources, including genetics databases. In each module, the focus is on teaching resource utilization within the context of answering a specific question.

Evaluation Process

EBL staff reviewed this project extensively prior to its online release, scrutinizing content in detail and considering such factors as navigation and appearance. Developers then made changes made based on librarian suggestions. The team also created an online comment form for feedback. Medical center clinical teams were encouraged to provide user feedback, with the incentive of entry in a raffle: all users who evaluated the module and submitted the electronic comment form were entered into a drawing for EBL T-shirts or a free lunch. A dozen responses followed, all of which were positive.

As we create additional modules, we plan to track usage statistics for the module pages and for the module-based links to database resources. In addition, all librarians who use the administration tool to develop instructional materials are expected to communicate suggestions and concerns to the module development team. Based upon such comments, we continue to refine the administration tool and user display, including options for adding lesson descriptions to main menus, additional templates, and choices of frame colors. Eventually we expect to provide use of the tool to other divisions of the medical center and will use their feedback to further refine the system.

To date, the only technical issue causing concern to module developers is the difficulty of resizing web page screen shots without loss of clarity. This is not truly a problem with the tool itself, but rather one of content preparation for entry. We are presently investigating improved software tools for capturing and resizing screen shots in order to solve this problem.

Conclusion

We have created a reusable electronic tool for quick and consistent creation of online instruction modules characterized by easy navigation, consistent display, and case-based

content. To date, seven knowledge modules are available, providing instruction in the use of various electronic resources, including citation databases, genetics databases, and our online catalog. Each module provides twenty-four hour desktop-accessible instruction in a format which models the process of answering specific questions, with links to sources of additional assistance from EBL librarians provided. Additional uses for the module development tool include the creation of staff training materials and the display of digital text collections. This efficient and highly flexible method of providing instruction in a digital environment provides an accessible approach to training which crosses barriers such as location and scheduling, increasing the EBL's ability to educate our users in resource access and utilization.