PROCEEDINGS OF THE CONTRIBUTED PAPERS SESSION
Biomedical and Life Sciences Division

93rd Annual Conference
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INTRODUCTION

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Innovative Applications for Digital User Services in Biomedical and Life Sciences Libraries

Library and database users' expectations have been dramatically altered due to the advent of the Worldwide Web. Some users have been lulled into thinking that they are expert literature database searchers, simply because they can "type stuff" into databases at their desk tops, and retrieve "something" on their topic. Other users believe that all information found over the Web is worthwhile, and that all worthwhile information is freely available over the Web. And many library users expect answers to their questions to be available 24 hours a day, seven days a week. These expectations have put extra responsibility on librarians and other information professionals to provide new information services, but also to educate their clients on how to evaluate Web-based information, how to search these Web resources, and when to throw in the towel and use the search services of a professional.

The papers selected for this year's contributed papers session cover a broad range of information services:

- a Web-based tool that brings together a variety of information resources of use to undergraduate biology students, and that helps them learn to search for and evaluate retrieved information;
- a new literature search service that would take advantage of modern features, such as links to bibliographic management software as well as the use of multidisciplinary and non-literature resources; and
- the integration of a librarian into a nursing informatics course.

In each of the above cases, the "innovation" of our session title refers not only to the new product or service created by our speakers. "Innovation" is also necessary in terms of user education and marketing of the product or service, such that they are seen as valuable and will be utilized by their intended clients. The innovations described in the following papers may serve as models for successful digital user services in biomedical and life sciences libraries.

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Optimal Information Foraging and Key Resources for Undergraduate Biology Students

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ABSTRACT

Every year universities enroll students who are not only computer reliant and technically savvy but also increasingly expect digital resources and services 24/7. At the same time finding high quality and course appropriate information amongst the vast array and diversity of tools presents a practical challenge for students and a pedagogical one for librarians. In response the Gerstein Science Information Centre of the University of Toronto is in the process of creating a "Desktop Library" aimed at first year biology students.

The guide is being developed in conjunction with a specific course, BIO 150, but ongoing use through a progression of undergraduate courses is envisioned. Faculty, undergraduate and graduate students are included in the development process via focus groups, usability testing and other methods of soliciting feedback. A gradual rollout is planned. This online tool will consist of two interrelated components.

The first component will create a "Desktop Biology Library" of core journals, monographs, guides, and other starting points with an emphasis on digital information. "My Library" technology is being used so that resource lists will be further customisable by users.

The second component is the creation of an "Optimal Information Foraging" web based tutorial linked to the "Desktop Biology Library". The main teaching objective is to

demonstrate through example and interactive exploration, successful searching and evaluation information strategies. BIO 150 has several existing modules, which have proven very successful as learning vehicles. Biological terminology will be used to facilitate relevance and interest, hence the title ""“Optimal Information Foraging”."

This paper will describe project planning, content and implementation. Lessons learned for library instruction, digital library technology and collaborations will also be discussed.

INTRODUCTION

The current generation of university students' computer literacy is matched by its expectation that information, resources and services will be available digitally, remotely and 24 hours a day. In response, many academic libraries including the University of Toronto (U of T), have aggressively acquired electronic resources. However, the very richness of resources challenges students, librarians and faculty alike. Computer skills cannot be equated with academic research skills, and so undergraduates, in particular, require training and guidance to identify assignment relevant information. Faculty note a proliferation of undergraduate research papers that cite only dubious quality web sites and demonstrate an abject lack of knowledge about scholarly information. Meanwhile, librarians face pedagogical and logistical challenges when trying to impart information literacy skills. Lakos (2001) notes "libraries and universities have to make access to information seamless, relevant and personally useful to clients and stakeholders while at the same time competing with new information providers." Mazoué (1999) postulates that access to a well-structured information rich database is key to delivering effective online instruction. Thus the mere provision of information and instruction is far from sufficient. Content, instruction and delivery must be practically and conceptually linked.

In response, the Gerstein Science Information Centre of the University of Toronto is creating a portal called "My Biology Library" and an online "Optimal Information Foraging" tutorial to target first year biology students. These two inter-twined components will provide selected resources and instruction on how to efficiently search for, find and evaluate scholarly information. A specific introductory course (BIO 150) was chosen due to a combination of factors: interest from the course co-ordinator; large class size; existing interactive online course components; course assignment requirements; and the potential for further use and adaptation by other higher level life science courses.

"My Biology Library", developed using "My Library" software, consists of a highly selective and annotated collection of predominantly online resources such as journals, periodical indexes, e-books and websites. The creation of this desktop library tool involved the participation of a small group of biology students, faculty and teaching assistants who represented its target audience. The emphasis was on ***selective*** resources since Pace (2001) and Ketchell (2000) remind us that users desire "personal recommendations" in order to cope with information glut. Ketchell (2000) asserts that as web users become more sophisticated, they migrate towards vertical sites, or "vortals", that address their interests, and away from general mega sites such as

Yahoo. As a result My Library is promoted for individual use. Currently, My Library implementations have been adopted mainly for library instruction and course support (Leamon, 2001; Ketchell, 2000; Ghaphery and Ream, 2000). Therefore, My Library technology can be described as one way of integrating resources into the workflow of the learner, researcher and instructor.

The "Optimal Information Foraging" tutorial addresses skills required to effectively use resources delineated in the "My Biology Library". We chose a web-based tutorial for several reasons. First and foremost, the large class size renders traditional library or classroom based instruction undesirable and logistically difficult. Students can learn at their own pace, time or place and refer back to sections as needed. This is an important factor as usage is envisioned to continue through a progression of life science courses. Furthermore, the medium complements the overall instructional delivery of the course since BIO 150 has several very popular online curriculum components and exercises. In order to incorporate active learning, quizzes and interactive game features from the open-source Texas Information Literacy Tutorial (TILT) (Fowler and Dupuis, 2000) will be integrated. Active learning opportunities provide students with the ability to review and test knowledge gained.

SETTING

The University

The University of Toronto is a large public and research intensive university. Of the approximately 2200 full time faculty employed, 800 are in the life sciences. The university consists of three campuses. The main downtown St. George campus serves 15,000 full time undergraduates while another 5,800 attend part time. There are almost 2,600 graduate students in the life sciences out of a total graduate population of 9,800. The vast majority of students live off campus.

The Library

The library is ranked third in North America by the Association of Research Libraries (University Of Toronto, 2001). The library subscribes to over 13,000 e-journals, 400 databases and almost 7,000 e-books. In total, the library holds over 15 million bookforms and 53,000 journal subscriptions across its 40 libraries. The Gerstein Science Information Centre serves the university's health science and science communities with holdings of approximately half a million bookforms and 5,000 current periodical subscriptions. In 1999-2000, 954,000 items were used in Gerstein out of a system total of 5,196,000. Gerstein has 43 full time staff of which five are reference librarians.

The Course

BIO 150, "Organisms in their Environment", is an "introduction to the diversity of life, how and why it arose, and the interactions of organisms with each other and the

environment.” Since it is a prerequisite for additional undergraduate life science courses, class sizes are approximately 1500 for the academic year and 300 for the summer term. A team of 6 instructors and 35 teaching assistants (TAs) deliver the course. The course uses lectures, labs and lecture tutorials. “Lecture tutorials” are weekly question and answer sessions with faculty. Heavy use of instructional technology is employed including web-based exercises and documentation, online test results and bulletin boards. As with many large courses, the required text is a course pack of book chapters, lecture notes and journal articles.

BIO 150 received the U of T’s prestigious Northrop Frye Award in 1999 in recognition of the course's "distinguished achievements in linking teaching and research." The link begins with course faculty who are among the most active researchers and teachers at U of T. Several professors have international reputations and have received major awards for research and teaching. They lecture within their areas of expertise and present material that is at the forefront of knowledge. Lectures, significantly enhanced by digital projections, effectively incorporate text, images and animation in a manner that presents biology as a living science.

Student achievement and critical thinking skills are encouraged. Funds from the Northrop Frye Award were used to endow a Summer Research Experience Scholarship. This program enables an outstanding student to gain practical experience in the disciplines of evolution, ecology or behaviour. Small cash awards are also given to the top ranked students. Lab sessions encourage students to think as researchers, make observations, ask questions and design experiments to test hypotheses. An effective TA training program which links teaching pedagogy with practical hands-on skills results in a 93% approval rating of TAs by students.

PROJECT RATIONALE

This project marries an identified need and an exceptional opportunity. The course coordinator perceived a lack of critical analysis and knowledge in student use and evaluation of information sources. Students required assistance not only in navigating the vast array of resources, but also in distinguishing quality scholarly material. The course coordinator approached the Gerstein librarians for assistance. The initial discussion, and dilemma, provided the rationale for intertwining resources and instruction. Working with the BIO 150 community allowed not only library instruction to reach a large number of students in the life sciences, but also a unique opportunity to collaborate with a large number of influential faculty and TAs who in turn can disseminate information about library resources to other constituents**.** Thus, the unique audience is a key marketing tool.

We assumed that our primary audience would be mostly students without prior library instruction but with good computer skills. We decided that the main focus of the tutorial, or its “hook” would be how much time the user would save by learning how to ***efficiently*** look for ***quality*** information. The overall tone reinforces the goal of time saving. This

overarching goal echoes that of the U of T and other My Library implementations (Ghaphery and Ream, 2000; Ketchell, 2000). More specific objectives are similar to other online tutorials (Fowler and Dupuis, 2000; Orians and Sabol, 1999; Sabol, 1998; Bender and Rosen, 1998):

- differentiating between the web, periodical indexes, and online catalogues;
- finding journal articles using an index;
- identifying primary research;
- deciphering a citation and determining if the journal is available in the library;
- using the catalogue;
- citing; and *above all*
- *evaluating* information

The turorial's three independent instructional modules focus on the web, journals, and monographs. The tutorial will have the same structure, look and feel as the existing course integrated online exercises and will use a biology example, hence the name "Optimal Information Foraging." It will be a pre-requisite exercise for a major research assignment. For most students, this assignment will be the first time they will have to present, orally and in writing, scholarly material and arguments. As Dewald (1999) states "students are most receptive to library instruction when they can see its immediate benefit to their course work or to an assignment that they face."

METHODS AND MATERIALS

The project was greatly facilitated by the careful use of seed funding, internal expertise and published studies. The core working group was comprised of two librarians from Gerstein as well as the course co-ordinator. A modest grant from a provostial Information Technology Courseware Development Fund allowed the hiring of the web site designers involved in the existing BIO 150 online exercises. The web designers are former course TAs and share a subject background. A graduate student was also hired for discovery and inputting of resources into the "My Biology Library" and content revision of the tutorial. All members of the team have a biology background with the exception of one librarian. We reviewed existing online instruction modules (Library Instruction Round Table, 2001) and consulted the literature with regards to their creation. A key message was how easily technology can become the driving force rather than a tool to forward the pedagogical objectives (Dewald, 1999; Simoneaux et. al., 1999).

"My Biology Library"

Like many libraries, the U of T offers the ability to create a personal portal of information resources. While Bonnett (2001) differentiates between customisation and personalization, they are often used interchangeably in the literature, as they are in this paper. My Library is a locally developed database-driven application encoded using

Microsoft Access and Cold Fusion. User authentication is carried out against the library's patron database. It can be used with any browser. Capabilities include:

- Members of the U of T community can collect and organize links to web sites, online resources, library materials, and any other resources they choose.

- Links to library e-resources and the library catalogue are database-supplied and therefore dynamically updated.

- Organization and look are customizable. Users can create folders, headings, titles, and notes and modify font face, size, and colours.

- Personalized current awareness profiles allow users to receive automated alerts.

Teaching staff and librarians have the additional ability to publish research guides which are then made available on the web without password or editing options. Hence "My Biology Library" is a published guide.

During the summer of 2001, a small sample of ten undergraduates, TAs and faculty used "card sorting" to aid in the design of the optimal content and structure of "My Biology Library". Cards included variations in both nomenclature (e.g. indexes vs. databases) and content. Participants were given a stack of index cards and asked to organise said cards into a hypothetical virtual biology library. Some cards were blank, some included specific resources, while others provided synonyms for tools (e.g. databases, indexes). Respondents were asked to present their design to a librarian. Qualitative analysis was performed on both the comments and the schema to arrive at the first design iteration.

My Library software was used to create a core list of biology journals, monographs, indexes and web pages. As befits its intended audience and as a result of the wealth of resources available, an emphasis was placed on U of T licensed digital resources. Stemming from the aim of saving users' time it had to be highly selective. Selection of periodical indexes, e-books and web sites was based on adapting criteria used in the literature (Wyatt, 1997; Davis and Schmidt 1995; Courtois and Goslen, 1996; Sinn, 1998; and Sisson, 2000) and subject directories.

The journal selection was challenging in terms of both content and relinquishing control. By nature, an introductory biology course is broad and encompassing. Collaborative content selection is seen as a key factor in My Library projects (Bonnett, 2001). The librarians compiled an initial list of journals based on the top 20 journals ranked by impact factors in various biology-related subjects from *Journal Citation Reports* (2000), as well as by selecting relevant journals from *General Science Abstracts, Biology Digest***,** and *Biological and Agricultural Index.* These indexes were chosen as those most applicable to a first year biology class. The course pack was also scanned and journals from required readings were included. Faculty assessed the list in consideration of their own needs and that of undergraduates. A preliminary list of 170 titles was compiled.

"Optimal Information Foraging" Tutorial

The "Optimal Information Foraging" tutorial is modelled on several existing online exercises created especially for the course. The exercises provided not only the basic framework for the tutorial but also a common look and feel:

- approximately one hour to complete;
- visually engaging;
- limited information per screen with supplemental information provided via links;
- interactivity provided via games and quizzes;
- unique content which is required for assignments and midterms; and
- common structure, look and feel.

Existing BIO 150 tutorials also provided an implementation schedule. Feedback is gathered in the first year to indicate needed changes. In the second year, content is formally incorporated into the curriculum and marking scheme.

Content was written by the librarians and then vetted by the graduate student assistant and course coordinator prior to being encoded into XML. The interactive features, which consist of Flash- and Java-based components, are considered integral to illustrating and enforcing the tutorial's concepts. Therefore, a text-based version was not constructed. Students of BIO 150 have access to not only computing facilities provided by the Faculty of Arts and Sciences, but also workstations within the U of T libraries. All the workstations on campus are capable of meeting the optimal technical requirements of the tutorial. The interactive features were also supplemented from the games available for downloading and modification from the open-source TILT module.

RESULTS AND DISCUSSION

The team built upon knowledge, experience and lessons learned from two existing stand-alone tools, a web based tutorial and a "My Library" resource. A previous collaboration with faculty from the Health Policy, Management and Evaluation Department created the first My Library pilot. This early implementation led to design changes within the software, accurate estimation of timelines, and a methodology for resource selection. In addition, a web based tutorial had been created the preceding year to complement an in-class lecture and demo for a third year biology research assignment. In addition to building upon knowledge gained from resolution of technical issues and database structure, the current project subsumes the pedagogical objectives of this stand-alone tool.

The developers envisioned a tool whose use would begin in BIO 150 and continue throughout the students' career as they take second and third year biology courses. Since faculty and TAs (mostly graduate students in the life sciences) significantly influence undergraduate information seeking behaviour, we needed to create a tool that

would appeal to all three user groups. A critical common denominator was the need to save time and effort. Faculty and graduate students involved in the course could use the "My Biology Library" to access their most frequently used e-journals and there would be a link to the appropriate section of the "Optimal Information Foraging" tutorial for undergraduate students who lack the knowledge and skills in finding articles from an index.

The project and approach have been time consuming. Librarians needed to acquire knowledge about the life sciences curricula. It is a decided benefit for a librarian to have a subject background in biology, particularly resource selection and suggesting appropriate examples and topics for the tutorial. In addition, knowledge of HTML coding is also advantageous in order to tailor the My Library interface to users' needs as well as modifying the TILT components to fit the tone and structure of the tutorial. Meshing time schedules for collaboration can be time consuming and complicated. We have found that the slower periods for librarians differ from those of web designers and professors. As Pace (2001) reminds us, My Library is new (hence additional) and different work. The same may be said for web based instruction.

A contextual design and implementation process is planned (Ketchell, 2000). A variety of formative evaluation tools will be used during the design phase. Both components will be launched this summer. Feedback from the summer class will be solicited and integrated before the arrival of the much larger fall class. In addition, the course co-ordinator will compare assignment grades as well as the quality and types of resources cited before (2002) and after (2003) implementation.

"My Biology Library"

Reade (2001) notes that "…the ultimate goal of customisation, at least as interpreted in an academic setting is to make the presentation layer reflective of the users' research process". It was important to incorporate user group input from the very start to ensure that the real needs of the biological sciences community, and not the librarians' perception of these needs, would be met. Hence the card sorting focus group exercise was conducted before work proceeded on either component. The results indicated:

- participant designs were quite divergent;
- confusion centred mostly around journal indexes (purpose and nomenclature);
- disparity over the inclusion of search engines such as Google;
- strong desire for e-journals to be listed in both alphabetical and subject order; and
- most participants assumed that all items would be in electronic format.

The card sorting exercise lead to the design illustrated in Figure 1. Another small sample will be utilised to review the current content and design before the initial summer launch.

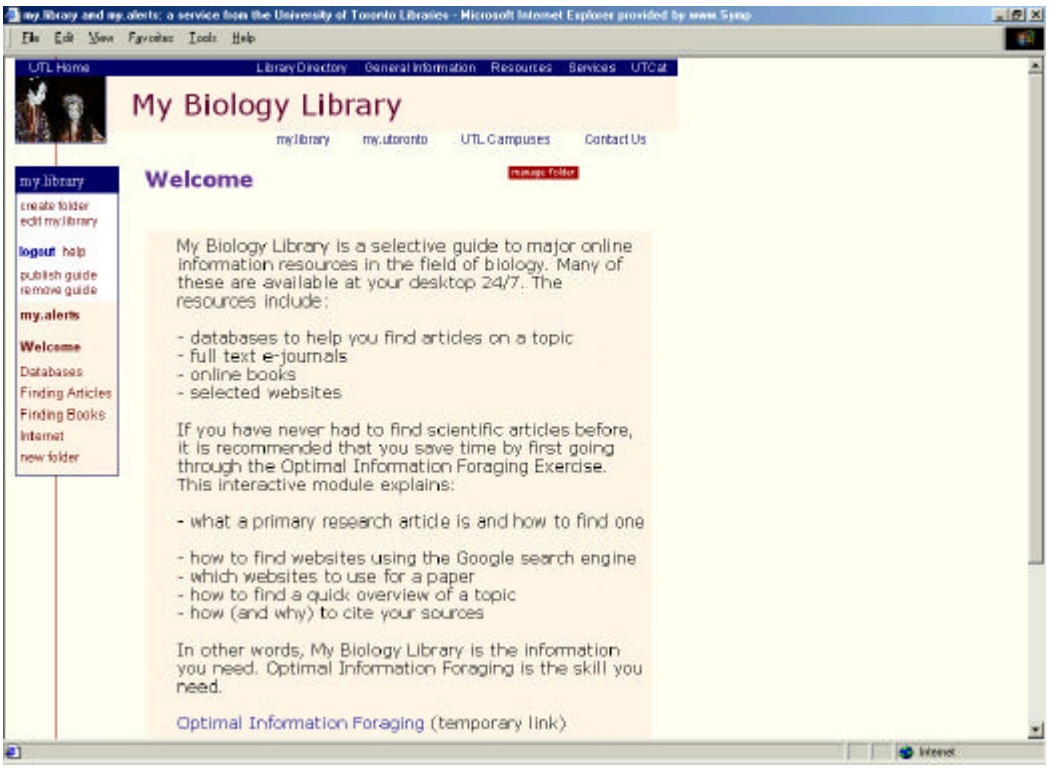

Figure 1. Opening screen of “My Biology Library”

Journal selection provided us with valuable lessons in the difficulties faced when we “take steps to cede control to our users” (Reade, 2001). Our user community mostly assumed that only electronic resources would be listed. However, Pace (2001) warns against the implicit devaluing of print resources by My Library implementations which only include electronic materials. Fortunately, only a few journals in the jointly developed core list were available only in print.

Inputting the journal section, entitled “Finding Articles”, was a time consuming task. Locating, deciphering and entering holdings statements that could be easily understood by users took time and patience (see Figure 2). This value-added feature was a priority for a number of reasons:

- This was a highly requested feature from the focus group, other My Library implementations and general patron suggestions.
- We needed to include print subscriptions since most e-journals begin in the mid-1990s thus giving a misleading and incomplete time frame.
- Many biological print journals are held in several different libraries; the holdings statements reinforce saving users' time by eliminating the need to search the catalogue.

Another value added enhancement was the addition of hypertext jumplinks at the top of every page, which enabled users to assimilate the content with a glance as well as quickly

jump to the desired section without scrolling. One example is the alphabetical links at the top of Finding Articles in Figure 2 that facilitate the scanning and searching of 170 journal titles.

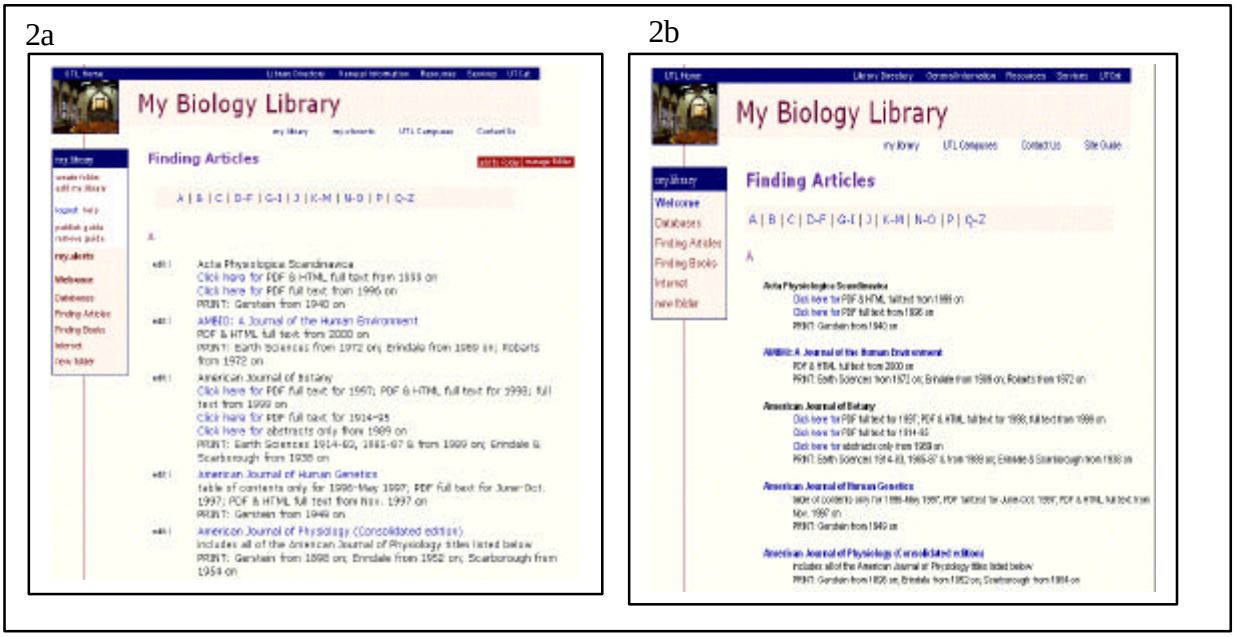

Figure 2. Finding Articles section of "My Biology Library" with holdings statements
2a. editor's screen 2b. user's screen

Future development goals for the university's My Library software include:

- integration with other campus portal projects;
- facilitation of shared information amongst individual my.libraries;
- increased connectivity with other software tools such as bibliographic management software; and
- the ability for an individual to edit a published My Library by creating a copy and further customise it for individual use.

Implementation of these goals is greatly anticipated, as this will allow members of the university community to not only further integrate information resources into their workflow but also enhance collaboration. For example, students, staff and faculty will be able to customise the "My Biology Library" into their very own personal information portals. They could create links to personal current awareness profiles, add or remove resources, or modify colours and presentation. Jasco (2001) postulates that the very success of vortals will depend on the extent of personalization.

Other developments are suggested by the literature. Currently, the project is limited by lack of web statistics. Hence we have no way of knowing which sections of the site will be most heavily used, the duration, frequency of use, etc. Collaborative filtering which "compares a user's tastes with those of other users in order to build a picture of like-minded people" is also seen as a key element to many personalised sites (Bonnet 2001). The preferences of the community are used to predict appropriate content. While Bonnett (2001) reminds us that this may be less important when categories of users and preferences are already well known and well defined, the life sciences community probably has a diversity of information preferences with varying degrees of attachment. Lastly, Ketchell (2000) envisions "next steps in personalization are likely to be interactive and require re-envisioning provision of service in a virtual environment." We can only begin to imagine how options beyond virtual reference service could be offered.

"Optimal Information Foraging" Tutorial

Navigation features and content independence allow easy transition between modules, although the linear direction of the tutorial is to first proceed to the web, followed by the journal and monograph modules respectively. We assumed that this was the natural starting point for an undergraduate versus the librarian's preference for background and overview materials found in books and encyclopaedias. Common internal navigation features that can be seen in Figure 3 include links to the web, journal, and book sections; glossary; tutorial's main page; and the BIO 150 main course page. As Dewald (1999) indicates, navigation is important not only in allowing the student some degree of choice in the order of progress but also indicating the organisation of the tutorial. Common sections, such as evaluating and citing, will be linked to from all three

modules. The tutorial will also be short enough to be completed within 60 minutes, which is comparable to the duration of other BIO 150 online exercises.

Figure 3. Draft opening screen of "Optimal Information Foraging" Tutorial

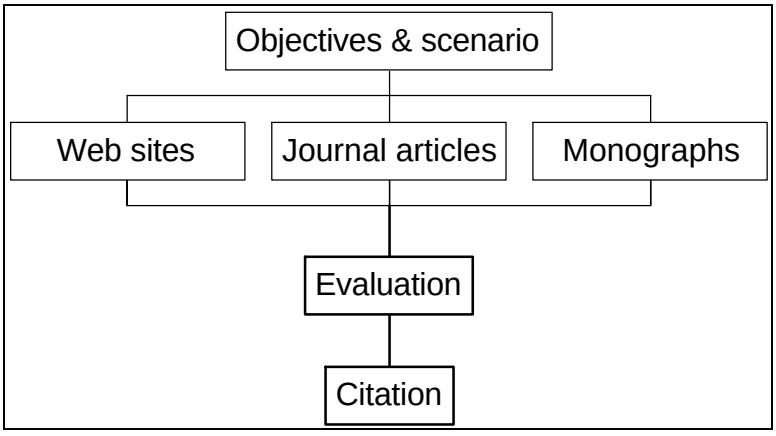

Figure 4. Flowchart of tutorial

Interactive games, quizzes and links reinforce major concepts. To maximise our limited funding we chose to adapt the Think Fast, Tiltometer, and Library Squares games from the open source TILT tutorial. Quizzes are a standard feature of BIO 150 online exercises and have been incorporated into the "Optimal Information Foraging" exercise as well. There are also links that lead to more detailed information from each section such as how search engines and paid placement work; different types of research articles; and the scholarly information and peer review cycle.

The most challenging aspect of tutorial design was to derive a storyline, or "hook" that would capture the students' interest and make it appealing. As mentioned earlier, the time saving factor was chosen. The opening screen will show a discussion between two students where one is relaying how much time was gained by employing the skills acquired from the tutorial. The second student is then compelled to try the tutorial *prior to beginning the assignment* since course work, a part-time job and an active social life inundate him / her. Content was written by one of the librarians, reviewed by the student assistant, passed to the second librarian for further comments and then the fourth draft vetted by the course co-ordinator prior to being encoded into XML.

The tutorial demonstrates how to find information from three different sources within the overall framework of researching a term paper on "alien/biological invasions". Close team co-operation was needed to select a topic. Early attempts involved developing content using examples of web pages with controversial content or strong biases in order to emphasise evaluation and critical selection. However, these examples were included among assigned paper topics, and so were discarded as conveying an unfair advantage to some BIO 150 students. We also concluded that the example selection had begun to drive the tutorial instead of the pedagogical objectives. The team decided the instructional content should exist independent of the example. If we change the example in the future to utilise "hot" topics, it should not be necessary to re-construct the entire tutorial. The objectives would then be the driving force and not be overshadowed by the example. Hence in the same way that technology can overshadow pedagogy, so can searching.

We also planned to couch the tutorial in biological terminology, especially within the biological construct of optimisation and foraging as a means of engaging the students' interest. The information seeking equivalents of the three standard features of optimisation models were considered:

1. Behavioural: should you continue to search for information on the Web or instead look in books or journals?
2. Currency: ultimate goal is to get an A on the term paper; immediate goal is to find good reliable information in as short as time as possible.
3. Constraints: users are not only faced with time constraints, but also scattered resources (source types for example), diminishing returns from utilising one resource (e.g. a journal index) and learning curve.

However, we felt that this might limit the tutorial's appeal to the broader life sciences community. In addition, we feared that biological terminology (rather than library jargon) would drive the content, not the instructional goals.

Tutorial use will be mandated by the course co-ordinator in 2003-2004. Students will be required to complete this online exercise prior to starting a research term paper and oral report. The assignment instructions call for a variety of references and not just websites. Articles from online journals with print counterparts are not considered websites.

CONCLUSION

Instead of building resources for a large group of undefined patrons, we are using our knowledge and collaboration with a specific course to build tools that will be generalisable to a large section of our user community. Collaboration, the key to generalisation, has been infinitely rewarding and at times infinitely challenging. This "ground up" approach requires a heavy time commitment, which we have somewhat obviated by sampling. Sampling has the added benefits of keeping users involved and checking our "information seeking" assumptions. It is also a very effective way to manage and delegate work for a large project while continuing other responsibilities.

Current delivery of library instruction often involves constant repetition of basic content in one-shot 50-minute sessions. There is usually not enough time to teach a progression of skills or concepts as opposed to mechanics. With an online tutorial to cover the information "basics," library instruction for U of T's life sciences could instead expand to higher level concepts such as more advanced search techniques, filtering, evaluation, as well as the structure of different indexes (e.g. Ovid MEDLINE). Similarly, reference staff often explains licensed databases and their relationship to library holdings. By intertwining instruction and resources we hope not only to provide 24/7 access to the digital generation, but also save user and staff time and more importantly improve relationships.

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WEB SITES

Information Skills Tutorial
http://www.library.utoronto.ca/gerstein/tutorial/index.html
- created with 2000 IT Funds using JLM 349, a 3rd year biology course example

Library Research Self-Study Exercise
http://www.cquest.utoronto.ca/zoo/bio150y/labs/libry99.htm
- shows existing integration between library and BIO 150 course

Health Administration Desktop Library
http://eir.library.utoronto.ca/myutl/guides/index.cfm?guide=healthadmin
- example of a subject specific research guide created via My Library

Bio 150 course site
http://www.cquest.utoronto.ca/zoo/bio150/admin/admin.html

Bio 150 self-study exercises
http://www.cquest.utoronto.ca/zoo/bio150/labs/online.html

"My Biology Library"
http://eir.library.utoronto.ca/MyUTL/guides/index.cfm?guide=biology

"Optimal Information Foraging" Tutorial
http://www.cquest.utoronto.ca/zoo/bio150y/oif/

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Integration of a Librarian into the Curriculum via WebCT

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INTRODUCTION

All across the country the number of transactions taking place at traditional reference desks is decreasing. It has become evident that we need to try new and innovative pilot projects to bring the librarian to the client (student, professor, etc.) rather than waiting for the client to come to us, whether it's in person, by phone or via e-mail.

Over the past few years, a number of different projects and ideas have come up to increase reference librarian and patron interactions via electronic means. Things like 24/7 reference, reference chat and reference e-mail are common in many libraries today. Teaching technologies such as WebCT and Blackboard.com have also been used by librarians to reach out to students more proactively but rarely do you see a librarian as a part of an instructor's own list of participants, along with students and other resource people, in a WebCT or Blackboard.com setting. Fall semester 2001, I was given this opportunity.

BACKGROUND

University of San Francisco (USF) is a moderate-sized Jesuit Catholic university in an urban setting. It is a "Carnegie Doctoral/Research Universities—Intensive" university. It has about 7500 FTE amongst the main campus and 5 distance learning centers throughout Northern California. Each satellite campus has a ½ time librarian. In the Gleeson Library/Geschke Center there are 12 librarians and the Dean.

Two years ago the Dean of the Library wanted to see a change in the way collection development was being done. The move was made from broad-based collection development done by several librarians to a library liaison model where individual librarians were selectors and contacts for each school and/or department. Beyond my administrative duties as Head of Collections, Reference & Research Services, I am the library liaison to several programs including the School of Nursing. Note that I do not have a background in nursing except that I have worked with nurses in a health sciences library and have a younger sister who is a nurse practitioner who I have assisted with her research. USF does not have a medical school and its nursing school consists of about 500 students (90% undergraduate, 10% graduate) and about 30 faculty/instructors.

The Dean of the School of Nursing has worked with the faculty to increase the research required by nursing students, particularly those students in upper division and graduate courses. There also has been a push to get nursing students and faculty to focus on evidence-based nursing, a trend that has been steadily increasing since the mid-1990s.

APPROACH

Soon after I arrived at USF in October 1997, I was encouraged by the new Dean of Nursing to attend a nursing faculty meeting to introduce myself. I was told by some of my librarian colleagues that the nursing faculty didn't use the library very much and there was very little outreach from the library as no one on the library staff had any background in the health sciences, or the physical and life sciences either. I came into the meeting by advertising what the library and the librarian could do for them and how I could improve the service given to the school. My reasoning was if I couldn't offer them improvements, they weren't going to listen to me.

Faculty are intimately involved with collection development at USF. I soon learned that faculty were still asked to submit book and journal orders to the library by handwriting or typing out "request to order" (RTO) cards even if they had all the information in a catalog or wanted to submit the information electronically. My first step in trying to win-over the faculty was to immediately offer them an improvement. Basically I told them don't fill out any more RTO cards! It was a waste of their time. They could send me the information in any way they saw fit and I would make sure it would be ordered even if I had to fill out the cards myself (which thank goodness I didn't have to). There were literally gasps from some of the long time faculty when I told them this. I then also offered my services to help with research and library instruction and successfully lobbied for them to get additional journals and databases.

Getting the Foot in the Door

At first, Nursing Faculty were very slow in bringing their classes over to the library for any instruction. The library did have one drawing card though, I brand new state-of-the-art electronic classroom that was the envy of many faculty on campus. I had one nursing instructor who was very keen on getting her students hands-on training in using WebCT for a couple of her lower division courses. I told her that the library classroom was only to be used for library instruction at the moment until we got a better feel as to how booked the classroom would be. Then I added, that if she could give me 10 minutes of a 50-minute session to introduce myself and give a brief library introduction, then I could also be a rover in her WebCT instruction session to help out students. She was thrilled with the chance to use the classroom and after a few classes found that my assistance as a rover helped in her WebCT instruction.

Proposal

Early spring semester, 2001 this same instructor told me that she had been asked by the Dean of the School of Nursing to develop an upper-division/graduate level class in Nursing Informatics. The instructor had just finished a Master's program in Nursing Informatics. She and the Dean convinced the curriculum review committee that new technologies in nursing were evolving so rapidly that it was important to prepare graduating nursing students to understand and use these technologies as they enter the workforce. The class was to be taught in both winter and spring semesters of the 2001/2002 academic year. The class would be classroom-based the first semester and move to a mostly online format during the second semester. For both semesters, she asked if I could give a 3-hour lecture/hands-on session on web and library database searching during one of the class meetings. She also mentioned she would be using WebCT for the course. I asked her what she thought of the idea of putting my name on the list of students on WebCT so I could participate fully with the class in any assignments, presentations, discussions, etc. She thought it was a great idea and agreed.

Between the times the instructor asked me to guest lecture and the class beginning, I thought that it might be a good idea to audit the course so I could learn the latest trends in Nursing Informatics as well as be able to communicate closely with other nursing students in the class via the WebCT interface. I wanted to see if the students found it valuable to have a librarian as one of their classmates and if I could build a closer bond so these students would continue to seek me out after interacting with me in class or online.

At the first class session, students all introduced themselves. I informed everyone that I was the library liaison for the Nursing program and would be auditing the class. After the first two class sessions, the instructor suggested that I should enroll in the class so I could get credit for all the work I would be doing. This meant taking online quizzes, writing papers, working on group projects and

a giving a final presentation. I agreed to enroll in the course as USF gives tuition remission for full-time employees.

Learning Experience

Fully participating in the course was of tremendous value to me as I learned a great deal about current issues in nursing and new technologies that nurses are dealing with. It was especially valuable to hear first-hand experiences from student nurses' clinical rotations of experiences they had with the technologies in their hospital as well as attitudes towards new technology by physicians and registered nurses. It gave me good insight on how people deal with new technologies in a library setting and what things should be considered.

For one of my assignments I had the opportunity to review a hospital information system. The instructor had provided a list of criteria to help me evaluate the system but other than that it was an area I new nothing about. Sitting down with the main system administrator and asking how the system operates, I saw many applications that could be applied to library and information systems. Things such as standardization of data, ease of data transfer from one part of the system to another, warning signals if the data entered are nonsensical, and using metadata to study trends in healthcare costs for particular procedures.

But as a librarian, what really piqued my interest was a discussion of nursing and health care taxonomy. In fact my final presentation was titled "Health care esperanto: promises and pitfalls of developing a unified health care taxonomy." In healthcare, what is driving the standardization of taxonomy is money. For example, the Health Care Financing Administration has already come up with "Current Procedural Terminology"(CPT) and a "Common Procedure Coding System" (HCPCS) that is used by insurance companies and Medicare/Medicaid to report services and procedures as well as get reimbursements. If the proper terminology and codes aren't used, no check is issued. Looking at all of the different, many proprietary, thesauri that exist amongst all of the different research databases, it's the lack of standardization of terminology that is putting money into the pockets of these database producers. NLM's Unified Medical Language System® (UMLS®) project is an attempt to deal with varying terminology from different groups/databases by creating a metathesaurus, but again, some of these thesauri are proprietary and require a license to use. Wouldn't it be nice to search across all health related databases with just one set of terminology?

EVALUATION

There was a significant time commitment involved in the project as not only was I attending class 3-hours a week, I was also spending 1-2 hours per week working on assignments or participating in WebCT discussion groups. In subsequent

terms, the time commitment would be less as there would be no need to be present (in person or online) for every class session.

Using WebCT as a "student" allowed me to better understand the information needs and issues that nurses are currently facing. I was able to share with the instructor and student nurses the librarian/information specialist point-of-view on a lot of issues. I frequently would post references to current newspaper and newsletter articles dealing with health care technology or current nursing issues to help get an online discussion going. Students had a chance to see me as a colleague on the same side of the desk, so-to-speak. By the end of the course students felt more comfortable sharing with me their frustrations in finding research to assist them in what is becoming more and more an evidence-based nursing practice.

One thing I did not expect was the instructor's reluctance to let me formally ask the students to evaluate my participation in the class. The instructor explained that she felt that by asking students to evaluate my instruction that I was attempting to take on a co-teaching role in the course that she wasn't willing to give up. By both lecturing in the course (teaching) as well as enrolling as a student, it blurred my role in the class both to myself and to the instructor. I should have thought through my role in the class more thoroughly and made sure the instructor and I were on the same page before proceeding.

One could argue that students also teach in classes. I know that I learn at least one new thing every semester from an instruction session I've presented to the class. This was this instructor's first attempt at an upper division/graduate level course. Courses she typically taught were in pathophysiology, which for nurses can be pretty cut-and-dried or clinicals, where you are really training the nursing students. In a course on Nursing Informatics one would expect students to have more questions and dissenting opinions on different theories and ideas presented to them. But I found that often, the instructor didn't take student opinions seriously or found them faulty when the majority of the class thought they had merit.

Although I was not allowed to formally get feedback from students in class, I did get a chance to informally talk to a few students outside of class. These students found that having a librarian in this class was a big asset in two ways. One is that as a librarian I could bring my own information/technology expertise into the classroom and share with others as a student. And secondly, students identified me as a readily available resource for any research assistance needed for other classes.

After speaking with the instructor at the end of the fall semester, she felt that the only way she wanted me to participate in the spring semester was to bring the class in for an in person guest lecture one evening during the term. She did not want to have me participate on the student WebCT list for spring semester.

Success?

I do see integration of a librarian into the curriculum via WebCT as a viable option but with a few caveats. The course should be one where a librarian's presence (in person or online) is warranted; a course in health care informatics or a research methods class would be good examples. You should have a strong working relationship with the faculty member teaching the class and make sure that the instructor is willing to have the librarian as a full participant.

I'd like to end on a positive note. After I finished my instruction session for the spring semester class, the instructor commented to me that the students in her class seemed to have a wide variety of proficiencies using and evaluating information resources. She saw a real need for standardized, lower division, one-unit course in library instruction that all nursing students would have to take before advancing to junior level. This would potentially put all nursing students on the same information research playing field as they advanced to upper division and graduate courses. This idea is currently being presented to the Dean of the School of Nursing.

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SearchAssist: Revisiting the Mediated Search — A New Model for Assisted Searching

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INTRODUCTION

Today's academic research library contains an ever-expanding array of end-user search products. In recent years, libraries have concentrated on creating more search options for patrons, more full-text access, and Web-based document request and delivery services. Why, then, would librarians wish to bring back and market a mediated search service, given that mediated searching has all but disappeared from the academic arena?

Recently, librarians from the Research and Information Services Department (RISD) at the North Carolina State University (NCSU) Libraries decided to do exactly that, after theorizing that there may be a place in today's academic library for a search service and then investigating this possibility through a pilot survey to faculty. Although limited fee-based online searching was available at the NCSU Libraries, this service was not marketed and little used. After reviewing the survey results, these librarians ascertained that mediated searching might be a popular and valuable service if:

- the service acknowledged that patrons can do self-searching, but that there might be salient reasons for requesting a librarian-mediated search, such as time constraints or the need to explore multidisciplinary, interdisciplinary, or unfamiliar topics;
- the search service incorporated relevant 21st century features, such as linkage to bibliographic citation management software and other electronic tools; and
- the searches were holistic and not exclusively limited to online database searching, also locating relevant print sources, materials from licensed databases, and spatial, statistical, or numeric data.

LITERATURE REVIEW

In the early days of online searching, databases were too complex and search interfaces too difficult for untrained individuals to perform searches. When the first end-user products were developed, the subsequent literature reflected mixed feelings; articles showed a general unease about the role of the librarian in this new environment. One common theme found in literature of this period is acknowledgement of the threat that end-user searching might pose to librarians. Ojala (1985; p. 93) states that, to many librarians, end-user searching "signals the demise of corporate librarianship by diffusing the function of information gathering throughout the corporation, relegating the library to a book warehouse and interlibrary loan operation." On the other hand, Kuhlthau (1996) theorizes that, given an end-user system, there is still a role for librarians as intermediaries in situations where end-users have direct access to information systems. She theorizes that there is a "zone of intervention" in which "an information user can do with advice and assistance what he or she could not do alone" and that this is affected by "the complexity of the task, level of uncertainty, and stage in the information search process." (Kuhlthau, p. 91)

In addition to the new role of intermediaries, many authors point to the possibilities that exist for information professionals when online searching becomes less popular. Librarians, according to some, need to operate more in instructional roles rather than searching roles. Witiak (1988; p. 51) states that "by taking an active role in end-user training, intermediaries can enhance their positions as information specialists."

Following the initial fears, many studies focused on comparing quality of end-user searches with that of mediated searches, with differing results. White (1996) states that most library professionals instinctively know that librarian searching is more cost-effective than end-user searching and asks why there are no studies to demonstrate this. Lancaster and colleagues (1994) compared the search results of 35 searchers in

an academic library in the ERIC database with searches on the same topic by experienced librarians and discovered that users found, on an average, only about one third of the relevant items, while librarians found closer to half of these items. End-users tended to be satisfied with poor search results with CD-ROMs. In contrast, “Information professionals generally utilized many more of the systems’ commands, used more terms in their search statements, their searches had more stages to them, they persisted more with their searches, employed more access points, and they were generally more satisfied with their searches.” (Lancaster et al., p. 372). While most of the literature found end-users less sophisticated searchers than professional librarians, some studies found that end-users were capable of performing the task. Sullivan and colleagues (1990; p. 27) studied doctoral students in both engineering and education at Stanford University and found that “Experimental subjects were no less satisfied with their retrievals, which were smaller but higher in precision than the retrievals produced by the intermediaries. End-users retrieved as many relevant references as the intermediaries.”

In contrast to studies that compare search effectiveness of end-users to librarians, other literature focuses on the reasons patrons decide to become end-users or mediated search requestors. These articles are useful today because many patrons are potential users of both methods of searching, depending on the circumstances of the search. Crea et al. (1992) found that end-users were likely to first try self-searching and would only seek mediation if they could not locate the needed information. Seago and Campbell (1993) surveyed patrons at the Medical College of Virginia who did both self-searching and mediated searching to determine why users choose one service over another and if perceptions of quality varied with the type of searcher. Reasons for selecting to do self-searching included personal preference, cost considerations, and the ability to browse results. Reasons cited for requesting a mediated search included perception of librarians’ familiarity with MeSH headings and time constraints. Fifty-one percent of respondents indicated that librarian-mediated searches were of highest quality, 31% stated that self-searches were of highest quality, and 8% responded that both systems were comparable. Grigg (1998) interviewed mediated search patrons of the Environmental Protection Agency-Research Triangle Park (EPA-RTP) library to determine what factors motivated these patrons to choose either a mediated search or to self-search. Many of these patrons used both search methods. Reasons cited for doing one’s own search included feeling that the search topic was too complex to explain to someone else, needing immediate results, and preferring to self-search. Reasons cited for choosing a mediated search included having little time to search, lacking confidence in one’s own search skills, and dealing with a topic that was multi- or interdisciplinary in nature.

Literature on mediated searching is scarce in recent years, and often focuses on declining search statistics. Lancaster et al. (1994), Grajek et al. (1997) and Tenopir and Ennis (2001) all report declines in mediated search requests in academic research libraries. For example, Grajek et al. reported that mediated search requests at Yale had dropped by 96% over 10 years, while end-user searching increased by that same amount.

Recent literature has focused on rethinking the approach to the end-user vs. mediated searcher dispute and on survival in this new environment. Hewett (1997) and Fourie (1999) discuss the future of online searching and the end-user. Hewett's article described the University of Birmingham's review of the future of online searching after mediated searching sharply declined from 1991-1996. After this review, the University decided to continue the existing service, while simplifying the charging mechanism. In addition, the decision was made to "offer a specialized service via the Science and Engineering Team where the greatest demand for such services appeared to exist" (Hewett, p. 283). Part of this service would include referring patrons to appropriate end-user products and investigating mediated current awareness services. Fourie (p. 15) suggests that "if handled with care, disintermediation could be a golden opportunity for information specialists—but this will require critical self-reflection, refinement of existing skills, continuing expansion of new skills, and active research involvement."

Why might a mediated search service be attractive to today's faculty and graduate students? First of all, faculty are more time-constrained than ever. Kezar (2000) states that faculty workload continues to increase, and is, in fact, higher than that of many other professional positions. In addition, she points to the increasing prevalence of multi- and interdisciplinary research. As users are more time-constrained than ever, it may be helpful to choose to defer certain literature searches to librarians. Additionally, when the search service is staffed by reference librarians with varied subject expertise, the ability to assist users with multi- and interdisciplinary topics is enhanced, as different subject specialists are able to work on a request as a team.

SERVICE DEVELOPMENT AND IMPLEMENTATION

To assess the level of interest in a mediated search service, a pilot survey of the faculty of the Chemistry, Food Science, and Zoology departments at NC State was conducted in May 2000. Of the 21 survey respondents, 8 (38.1%) said that they would definitely use the service, 10 (47.6%) were not sure, and 3 (14.3%) indicated that they would not use the service. Sixty-five percent thought that graduate students should have access to such a service. Of the 18 faculty members who said that they would either use the service or were not sure, 15 (83.3%) selected e-mail (instead of print or diskette) as their preferred format for delivery of search results.

Because survey results indicated that there was interest in using a mediated search service, a proposal outlining the costs, benefits, and development process for such a service was submitted to the NCSU Libraries administration, and that proposal was approved. Feedback from the subject specialist librarians was also solicited during all

phases of the service planning and implementation, since their acceptance of a service that could potentially increase their workload was critical.

As originally conceived, the service, called SearchAssist, was intended primarily for NC State faculty and graduate students, and university administration. The list of eligible user groups was later extended to include undergraduates engaged in research grants and projects, and research staff. SearchAssist was designed to include two main components: 1) one-time searching of electronic databases—or relevant non-electronic resources, when no electronic format is available, and 2) the establishment of current awareness profiles, whereby patrons would receive regular notification of recently published journal articles on their research topic.

Subject specialists would rely first on the databases already in the NCSU Libraries' e-resources collection (either by ownership or by subscription). Other, fee-based online database services would be used only if needed resources were not otherwise available. In a model similar to that of paying for interlibrary loan materials, the NCSU Libraries would absorb up to $100 in search costs per researcher per semester; the patron would be charged for any costs exceeding that amount. To free both patron and searcher from the physical space of the library, electronic mechanisms for submitting search requests and delivering results were emphasized in the service design.

SearchAssist is highlighted on the Libraries' Web site at http://www.lib.ncsu.edu/searchassist/. This page includes a description of the service's features and benefits and a "Submit a Search Request" button. Because the service is limited to NC State faculty, staff, and students, patrons must log in and be authenticated as valid users before gaining access to the search request form. They are then asked to complete a simple request form by providing basic contact information and some additional details about their request: a description of the search topic, the preferred format for delivery of search results, whether or not search updates are desired, and form of payment (if applicable).

Requests are delivered to a central SearchAssist e-mail folder and forwarded to the appropriate subject specialist for the request topic. The subject specialist then contacts the patron via telephone or e-mail to conduct a reference interview before beginning the search. For each search, the subject specialist fills out a one-page checklist, recording the answers to key reference interview questions and other search-related data, such as the amount of time spent on the search, any search costs, and whether or not the patron asked to have results delivered in a format that could be imported into EndNote citation management software. The search checklist and the e-mail output from the Web request form are submitted to the RISD administrative secretary, who maintains a spreadsheet of search request data to be collected for service statistics. To protect patron confidentiality, search request topics are not included on the spreadsheet; only the recorded initials of the subject specialist(s) who conducted the search provide an indication of the search content.

Printed copies of the search checklist, the SearchAssist procedures, and the paper version of the search request form were distributed to searchers. The files for these documents were also placed in shared space on the computer network, so that subject specialists could print extra copies as needed. Later, printable .pdf versions of the checklist, procedures, and request form were also made available on the NCSU Libraries staff intranet; this has made the documents more accessible to the subject specialists at the four branch libraries.

RESULTS

SearchAssist was rolled out on September 4, 2001, accompanied by limited marketing including an article in the *NCSU Libraries Newsletter*, a notice in the "Spotlight" section of the library Web page, and a message to a graduate student electronic mailing list. Individual librarians did more targeted marketing, including a "Message from the Librarian" for some of the disciplines represented in the MyLibrary@NCState portal and an article in the Natural Resources Library newsletter.

In the first six months of the service (September 4, 2001 through March 3, 2002), 99 search requests were completed. Sixty-four (64.6%) of these search requests were from graduate students, 21 (21.2%) from faculty members, and 7 (7.1%) from university administrators. Another 7 (7.1%) requests came from patrons who identified themselves as staff members; however, one of these individuals, who submitted two requests, is also a graduate student whose search topics actually related to his graduate work, and two other requestors, one of whom submitted two requests, are librarians and therefore have faculty status.

The search requests came from 77 patrons. Sixteen patrons submitted more than one search request; five of these patrons submitted more than one request on the same date. SearchAssist also started receiving unsolicited "repeat" business during this period; 13 (16.9%) patrons submitted another search request after receiving results from one or more earlier searches. These repeat users included eight graduate students, two faculty members, two of the three incorrectly labeled "staff" members, and one administrator.

Search requests were received from 33 different university "departments": 23 (32.4%) of the 71 academic departments; and 10 non-academic departments or units, including Cooperative Extension, Learning Technology Service, and university administration. Education faculty and graduate students alone accounted for 26 (26.3%) of the total number of search requests. Those from the three departments in the College of Natural Resources submitted another 18 (18.2%) requests. Ten other departments in the physical or biological sciences, textiles, or engineering submitted at least one request, together accounting for another 15 (15.1%) of the total. The nine departments that submitted the most requests are shown in Table 1.

Table 1. Departments Submitting the Most Search Requests in the First Six Months of the Service.

Department	Number of Requests†
Educational Research and Leadership & Counselor Education	14
Adult and Community College Education	12
Parks, Recreation and Tourism Management*	10
Political Science and Public Administration	7
Business Management	4
English	4
Psychology	4
Forestry*	4
Wood and Paper Science*	4

† Of a total of 99 search requests during this period.
* Indicates that the department is part of the College of Natural Resources.

Not surprisingly, 85 (85.9%) search requests were submitted via the Web form. Patrons received e-mail delivery of search results for 97 (98.0%) of the searches. In other findings related to search results options, it was noted that most search requests seemed to result from a one-time information need; only 6 (6.1% of requests) patrons asked for regular search updates. Also, only 7 (7.1% of requests) patrons asked to receive search results in a format that could be imported into EndNote citation management software.

As expected, preparing for and conducting the actual searches required a considerable amount of librarians' time, ranging from 5 to 480 minutes per search. The mean time spent on a search was 148 minutes; the mode was 120 minutes. Of more interest was the finding that 27 (27.3%) search requests were either interdisciplinary in nature or were on a topic that was outside the patron's department or usual subject area; therefore, one or more librarians who were subject specialists for the search topic(s), rather than for the patron's department, handled the request. None of the searches required the use of a fee-based service.

DISCUSSION AND CONCLUSIONS

The increased availability of end-user databases has, in many settings, reduced demand for mediated searching and raised questions about the viability of mediated

search services. The experience with a new mediated search service at the NCSU Libraries, where almost 100 requests were received in the first six months, suggests that a need for mediated searching still exists. A review of the NCSU Libraries' experiences with SearchAssist highlights several trends in terms of the reasons patrons request a mediated search, characteristics of users of the service, the nature of search requests, and desirable features of a search service in the current library environment.

Reasons for Using a Mediated Search Service

Mediated searching offers several potential benefits to patrons: increased access to databases and the professional skills of librarians, and convenience and timesaving factors. Many patrons (over 25%) seem to use SearchAssist when they are conducting research in multi- and interdisciplinary areas outside their comfort zone. One example is a plant science graduate student who requested information on the world market for plant proteins. This search was performed by the business librarian, rather than a life sciences librarian. Given the increasingly interdisciplinary nature of contemporary scholarship, this suggests that mediated searching may fulfill an important and growing role in research settings. Interdisciplinary searches also provide an opportunity for collaboration between librarians with different subject specialties.

In addition, feedback from an informal survey of SearchAssist patrons suggested that the "timesaving" aspect of the service is a selling point. Further, initial results indicate that patrons are not likely to pay for search results. When patrons request a search, they are asked if they are willing to pay for the use of additional, specialized fee-based databases, but very few indicated their willingness to pay.

SearchAssist also provides an opportunity for a patron to request regular updates on their topic, although very few (6%) such requests were made. One possible explanation for this is that most search requests are based on one-time information needs; an alternative explanation might be that not all patrons understand the nature or value of this additional service.

Mediated searching is not only advantageous for patrons using the service. Librarians gain outreach opportunities to inform patrons of new research (current awareness) and information resources. A search service also highlights the value of the librarian and increases the library's visibility in supporting university research.

Surprisingly, for many patrons, use of the service involves a strong educational component. Patrons report using the search history, search terms, and lists of databases provided with their results as ways of learning how to improve their own searching. This is particularly satisfying for reference librarians in an academic setting where instruction is highly valued. It is also intriguing given the demographic breakdown of patrons (see next section).

Who Uses the Service?

One of the primary goals of SearchAssist is to support university research, and thus the service is focused primarily on faculty, graduate students, and administrators. A notable finding was that nearly two thirds (64.6%) of search requests came from graduate students. Many of these requests were related to thesis or dissertation topics. However, in some cases, requests involved course assignments. In fact, faculty in two courses referred their students to SearchAssist. This has generated lively discussion among librarians about how to balance the educational and service missions of the library for this user group.

Analysis of the disciplines and departments using the service revealed that the physical and biological sciences, textiles, and engineering departments together submitted only 15% of the total requests. This is surprising in light of Hewett's (1997) report about the University of Birmingham's conclusion that science and engineering subject areas would have the highest demand for a mediated search service and also because NC State is strongly focused on science and engineering. In contrast, a single college, Education, accounted for over one quarter (26.3%) of the total number of requests received. These patterns, however, are strongly influenced by marketing efforts, and many departments have not yet been the focus of targeted marketing.

The SearchAssist experience to date emphasizes the importance of marketing; greater numbers of requests have come from groups or departments that were the recipients of targeted marketing. For example, SearchAssist was marketed to graduate students by sending two announcements to an electronic mailing list. In addition, the service was marketed to the College of Natural Resources in both a newsletter and in several library instruction sessions; that relatively small college has generated 18.2% of the total number of requests (see Table 1).

Because marketing has had such a strong influence on the number of search requests, it is not possible at this time to draw conclusions about disciplinary differences in the use of mediated searching, as not all departments have received comparable marketing efforts.

Evaluation and User Satisfaction

A detailed evaluation of the SearchAssist service is tentatively planned for Fall 2002. During the early months of the service, an informal survey of user satisfaction was performed, and comments were generally positive. A very satisfied graduate student commented, "You saved me countless hours, the articles are terrific, and you were very expedient." Some comments focused on the timesaving aspects of the service; one faculty member said the service was "Very helpful for somebody who is very 'time challenged.' Now if you could just write my manuscripts for me the service would be complete …" Other comments focused on quality of search results; a graduate student said, "I am very satisfied with this service, it came up with many more resources that I had not had the time to find nor found on my first several searches." In addition, 13 (16.9%) patrons have submitted additional search requests after receiving results from earlier requests, suggesting satisfaction with the outcome of these earlier requests.

Technology and Special Features of the Service

SearchAssist was designed to take advantage of electronic tools such as Web forms, e-mail, and citation management software. The vast majority of patrons have utilized most of these features: 85.9% of all patrons utilized digital means of submitting requests, and 98% utilized digital means of receiving results. A much smaller number of patrons (7.1%) requested search results in a format compatible with citation management software.

SUMMARY AND CONCLUSIONS

In conclusion, the initial response to SearchAssist at the NCSU Libraries has been significant and favorable and is expected to grow with additional marketing efforts. Preliminary results suggest that mediated searching is still a viable service, and is apt to be most useful in specific settings or situations (e.g., for patrons facing time pressures, or required to search in an unfamiliar subject area). One surprising finding was that, for many patrons, mediated searching played a strong educational role: teaching them by example how to improve their own searching. It is also clear that older models of mediated searching must be redesigned to incorporate recent trends in research, especially multi- and interdisciplinary searching, and utilization of technologies such as citation management software.

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