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Library Trends

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Introduction

KAREN MARKEY

In 1982, the Council on Library Resources (CLR) provided support to enable a team of researchers from five different organizations to conduct a nationwide study of online catalogs. The findings of this nationwide study revealed strong acceptance of this new form of the library catalog by library patrons and staff. The predominant searching approach was by subject. Study respondents expressed their needs for easy to use system interfaces and self-explanatory displays of bibliographic information. Asked to suggest online catalog improvements, patrons requested subject searching improvements.

The publication and dissemination of the results of the 1982 nationwide study fostered a new phase of research in online catalog use and enhancement of existing online catalogs. The authors of the eight articles in this online catalogs issue of Library Trends are building upon the findings of previous research of online catalog use and users by improving existing online catalogs with system capabilities requested by library patrons and staff and by initiating new research efforts that confirm or amplify previous findings.

The papers by Margaret Beckman and Susan J. Logan feature ongoing improvement of their libraries' integrated library systems. Beckman cites early implementation of an automated system, costs, changing technology, and local user needs as the chief impetuses for transforming the University of Guelph's online circulation and inquiry system into an online catalog. These four factors were also instrumental

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KAREN MARKEY

in the library's enhancement of the online catalog with subject searching, authority control, and Boolean searching capabilities.

Logan highlights online searching and display of related terms in The Ohio State University Libraries' catalog. These related terms were added to the online catalog through the processing of the machine-readable Library of Congress Subject Headings. The inclusion of related terms in online catalogs was the online catalog improvement requested most frequently by online catalog users in the 1982 nationwide online catalog study.

Following the 1982 nationwide online catalog study, the Council on Library Resources sponsored a number of conferences and research projects on specific aspects of online catalogs such as subject access, system requirements and design, and patron training in online catalog use. Drawing on his expert knowledge of integrated library systems and experience in the 1982 nationwide study, Joseph R. Matthews recommended guidelines for screen layouts and displays of bibliographic information in a CLR-sponsored conference attended by online catalog designers. Consistency, brevity, and compatibility are three concepts that Matthews emphasizes in his guidelines for screen layouts and displays of bibliographic information.

A CLR-sponsored conference on training patrons in online catalog use revealed an urgent need to explore systematic and formalized learning objectives for teaching and evaluating online catalog use. Brian Neilsen's paper summarizes the results of a research project supported by the Council on Library Resources investigating different teaching approaches and objectives. Sally Kalin places a spotlight on the invisible users of online catalogs—remote users—who access the online catalog from their dormitories, homes, and offices. Kalin recommends types of technical and searching assistance that are different from the types of assistance provided to online catalog users who access the online catalog in the library and suggests that future studies of online catalog users consider remote users in their design.

The finding from the 1982 nationwide online catalog study that subject searching is the predominant mode of searching by library patrons conflicted with the findings of previous studies of traditional library catalog use. Ben-Ami Lipetz and Peter Paulson were supported by CLR in their 1984 study of library catalog use at the New York State Library. The researchers measured subject searching by library patrons before the introduction of a subject searching capability in the library's online catalog and after the introduction of such a capability. They provide startling and irrefutable evidence that the proportion of subject searches increases when patrons are offered subject access in the online
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catalog. A new finding from this study is that the introduction of subject searching increases use of the library catalog in terms of the ratio of searches performed to the number of library visits in a given time period. Furthermore, this increased use comes from library patrons who were previously nonusers of the library catalog rather than from previous users of the library catalog.

The British Library Research & Development Department (BLR&DD) has supported a number of research efforts investigating online catalog use in the United Kingdom. Janet Kinsella and Philip Bryant summarize these efforts and discuss the recently established Online Public Access Catalog (OPAC) Research Programme of the BLR&DD. With assistance from OPAC researchers in the United Kingdom, BLR&DD outlined five main research areas in which the department will give priority for financial support of research projects over the next three years.

OKAPI (Online Keyword Access to Public Information) is an experimental online catalog developed by a research team at the Polytechnic of Central London and supported by the British Library Research & Development Department. In a description of OKAPI's functionality, Stephen Walker highlights the exceptional capabilities of this catalog, particularly its user-friendly interface and search trees for known-item and subject searches. An evaluation of OKAPI by patron users at PCL demonstrated needed system improvements. The OKAPI research team has received additional support through the BLR&DD's recently established OPAC Research Programme and is now enhancing the system by adding an automatic stemming routine, synonyms and cross references, spelling correction, and relevance feedback.

The concluding paper in this issue by Charles R. Hildreth describes the functionality of three generations of online catalogs. Commercial system designers are decelerating system development now that they are firmly entrenched in the support and maintenance of installed second generation online catalogs. Hildreth demonstrates that second generation catalogs do not meet the growing expectations and demands of online catalog users, and, in many instances, do not even provide satisfactory results in response to users' online catalog searches. Hildreth highlights third generation capabilities for online catalogs and suggests how system designers can enhance existing systems with such capabilities.

With a new form of the library catalog in the making, library staff and system designers now have the opportunity to make changes that were never before possible with the traditional library catalog. This
phenomenon is effecting changes in the online catalog even as we observe it because the opportunity now exists to start over. The authors of this issue are involved in this dynamic process of online catalog design, implementation, user training, user evaluation, and system improvement. They describe their efforts to conduct new studies of online catalog use and users and their efforts to improve existing systems based upon user needs and research findings. It is hoped that their recommendations and decisions will ensure that online catalogs continue to meet with the acceptance and satisfaction of library users.
Online Catalog Development at the University of Guelph

MARGARET BECKMAN

Introduction

There are great differences in approaches to library automation, whether in the choice of a vendor or of an in-house design; the use of a bibliographic utility or the sharing of regional records; the initial implementation of a circulation system or of acquisitions. To some it may appear that these differences create impediments in the goal to achieve national and international access systems that will allow effective identification and location of all scholarly resources and thus the efficient sharing of those resources. However, it must be recognized that the direction for automation adopted at any one time by an individual library may reflect a particular set of circumstances in that university or community which make a specific choice or decision uniquely valid. For that reason it is important to understand the environment that existed at the time the direction was established and to place the library and its decisions in that context. The experience at the University of Guelph, in developing and implementing automated systems including an online catalog, illustrates this principle.

The University of Guelph Library 1964-76

The University of Guelph was incorporated as a university in 1964 from the integration of three century-old agriculturally based colleges which are located some fifty miles west of Toronto in the heart of
Ontario. By 1986 the university had grown to encompass seven colleges with emphasis on biological, physical, and social sciences. Present enrollment numbers more than 10,000 undergraduate students with an additional 1200 graduate and 3000 part-time students. As well, the university includes four research institutes and receives research grants that are among the largest in Canada.

In 1964 the library consisted of three separate operations in each of the original colleges as well as some dozen branch libraries in the largest—the Ontario Agricultural College (OAC). A collection of 350,000 books, serials, and documents was spread across the campus, and access to the collections, through three totally separate cataloging systems, was less than adequate. A Library of Congress conversion was underway in the central OAC Library, with Dewey classification remaining in the branches and in the other two colleges.

With the 1964 incorporation as a university, the library received not only an acquisition budget which was too large for the existing staff to process but also a gift of 65,000 new monographs, complete with catalog cards, from an Ontario government project in support of new universities. An unprecedented work load led to an increasing backlog of unprocessed material—50,000 volumes by 1967. The government document collection, an unusually good but totally unorganized and inaccessible resource of more than 100,000 items, was a serious problem. Moreover, no central record had been kept for periodicals so that duplication and inconsistency was compromising use of this important collection.

In 1965 the university received provincial funding for a central library building of more than 250,000 square feet to house all collections on campus and which was to be opened, with integrated collections and access, by the spring of 1968. Although automation was, at least by today's standards, a very primitive affair, it seemed in the spring of 1966 to be the only solution to the task ahead—i.e., to catalog in one system all monographs belonging to the university; to classify, catalog, and establish check-in records for all periodicals; and to organize and provide access for the government documents. At the same time it seemed foolish to consider designing a new library building with systems—of circulation and access, at the least—that did not recognize new technologies. Accordingly, the new library was planned to incorporate an automated circulation system in the building design, and all library functions were allocated space based on assumptions of the implication of automation for their locations and relationships. With an imposed deadline of only two years in which to design systems, create records, and process material, expediency was the major factor in the decisions that were made.
Online Catalog Development

In Canada at that time there were a few libraries experimenting with automation, most importantly the universities of Toronto and British Columbia, but there were no models to follow for a total program and no vendors from whom to buy a complete product. No thought was given to the possibility of a future in which an integrated online library system might be commonplace, and Guelph initiated a three-phased attack on the collection organization and access problems outlined earlier:

—Serials were to be classified in Library of Congress, with a simplified machine-readable catalog record which included holdings information originally developed at the University of British Columbia. This was used to produce a shelflist as well as paper or book catalogs;
—Documents were organized in an automated system designed in the University of Guelph Library, based on an organizational document code and with access provided through six separate book catalogs: corporate author(s), personal author(s), title, serial title, keyword (KWOC index), and document code.
—The circulation system was based on a limited machine readable catalog record.

Although not all catalog elements were included in the circulation record due to limitations placed on record size by the computer hardware in the University Computer Centre, the early MARC format was followed for the elements which the record contained. This decision proved fortuitous since additions to records, not conversion, were all that was required for the later "automated" catalog.

The new McLaughlin Library did open at the University of Guelph in August 1968 with an automated circulation system using punched circulation transaction cards and card readers. All books and periodicals were on the shelves in classified (Library of Congress) order, with no backlog of unprocessed material, with computer produced cards for the books, and with similarly produced book catalogs for both periodicals and documents. The students and faculty adjusted to the new access tools—including uppercase printing on the catalog cards—as quickly as they did to their surroundings of individual carrels and private studies which were luxurious by previous standards.

During the next few years, the library kept pace with changing technology, moving from the crude IBM punched cards to a C-DEK data-collection system for circulation; from simplified uppercase catalog cards to full MARC records in standard format. The book catalogs for documents and serials were transferred to microfiche in 1973 and were joined by a similar (and duplicate) catalog for mono-
graphs. These COMfiche catalogs were accepted with enthusiasm by the student and faculty users—they were easier to use and more timely than the massive book catalogs with their irregular supplements. A new system was also developed for cataloging maps, and a supporting acquisition system was in an early design phase.

Concurrent with these developments at Guelph, the other libraries in the Ontario university system were also moving into an automated environment. By the early 1970s the Council of Ontario Universities, a coordinating body for the province's fifteen universities, encouraged the development of a cooperative library system based on existing activities such as interlibrary lending and an interuniversity transit system. Two union catalog systems were added to this foundation—CODOC, a cooperative use of the Guelph document system; and CUSS, a union list of serials based on the adoption by most Ontario university libraries of the University of British Columbia system. These two projects produced what could be called quick and dirty COMfiche lists. Some duplication occurred in both lists but this was not considered a serious problem, since the primary intent of the projects was to share resources and provide locations. The provision of catalog records, although the union lists could be and were used for that purpose, was seen as a secondary objective.

These objectives were reversed, however, with the initiation in 1974 of a union catalog project based on a concept of the sharing of catalog records through the Canadian bibliographic utility, UTLAS. The six Ontario pilot libraries—which included Guelph—were joined by seven university libraries from Quebec, making the project, Unicat/Telecat, bilingual. Representatives from each library began the development of agreed standards for cataloging and record format as well as a process for monitoring their use and ensuring quality. This idealistic concept turned out to be expensive, particularly for those libraries which had existing machine readable catalog records for all holdings. A review done at Guelph during the second year of the project revealed that the majority of records received through the project were actually from the Library of Congress, and that the benefit of receiving records from other libraries was outweighed by internal costs for revising existing records to meet the standards of the received copy; for communications and centralized processing charges; and for loss of staff time in Unicat/Telecat meetings. Guelph withdrew from the project in July 1976 and returned to tapes from the National Library of Canada (which included the Library of Congress MARC records) as the source of machine readable catalog copy at a fraction of the cost of records received from the centralized bibliographic system.
Online Catalog Development

Changed Directions—1976

It was at this point that local events again precipitated a new direction. The offline circulation system—C-DEK—was no longer on the market, and its Mohawk terminals were breaking down with no opportunity for replacement or repair. Internal charges from the University Computer Centre for the production of the serial, map, book, and document COMfiche catalogs and supplements, as well as for the catalog cards, daily circulation lists, and overdue and fine notices, were mounting. At the same time the university was moving into a period of financial restraint which was already reflected in the library’s operating budget.

Changing technology also precipitated Guelph’s action. As Richard de Gennaro noted in April 1983: “Three major developments occurred in the early 1970’s which had profound and far reaching effects on the course of library automation and library management: 1) the emergence of the first cheap and powerful minicomputer; 2) the coming of sophisticated online systems; and 3) the development of powerful telecommunications capabilities.”¹ Anxious to make use of these new directions, Guelph surveyed the marketplace but found no vendor willing to meet the requirements which were established for a Guelph online circulation system: namely, public access to both borrower (circulation and reserve transactions) and book information and a linking of the databases for monographs and serials (MARC standard) with documents and maps (non-MARC) in one access system without record conversion.

Guelph therefore entered into a joint development agreement with the Geac Corporation, and an online circulation and inquiry system was implemented for the 1977 fall semester. This system—now known as the Geac Library System—initially had two modules, Book Inquiry and Borrower Inquiry, and could be accessed at Guelph in the central library or in the branch in the Ontario Veterinary College.

From Online Inquiry to Online Catalog—1983

It was originally assumed that the circulation or borrower inquiry function would be the most important feature of the online system, as students determined which books they had out, when they were due, and what, if any, fines were owing. It was quickly proven that this assumption was wrong, however, as students discovered that they could use the book inquiry function as a catalog for locating desired books or documents by author, title, or call number. An in-depth study of this inquiry
function conducted in 1980 revealed that 80 percent of the students enthusiastically endorsed the “online catalog” —incomplete as it was—preferring it to the card and COMfiche catalogs with which it was compared in the study.2

It is useful to identify exactly what was available in that 1977 online inquiry—the first phase of the Guelph online catalog.

— a brief monograph record, giving author, title, date, edition, and call number in MARC format;
— a government document record in non-MARC format with non-LC classification;
— access by author (personal or corporate);
— access by title; and
— access by call number (LC or document code).

The major complaint which both faculty and student users had about the system was lack of terminals. Even faculty members—more than 50 percent—conurred with the student assessment that online inquiry was easier to use and was more successful in retrieving books than either the card or COMfiche catalogs.

With this background of positive response, Guelph moved to change the simple book inquiry module to a true online catalog. Using the local experience as well as reports from the growing number of developing online catalogs in other universities, Guelph established requirements for an online catalog. Two factors were considered of paramount importance—cost and user needs, or perceptions. The second factor was the easiest to address.

From a user viewpoint the following criteria were established for online catalog development:

— terminals in sufficient numbers to eliminate waiting;
— response time of less than two seconds;
— all library resources accessible in one system;
— a simple, easy-to-use system, requiring no assistance from staff;
— remote access (this feature was added to the original online system during its second year of operation);
— subject searching, including searching on keywords, not just a controlled vocabulary;
— authority control and linkages from words or names not used to those that are;
— access to more than the basic record elements: series titles; multiple authors, either personal or corporate; and added titles.

As well, it was recognized that online data transfer for acquisition or
bibliographic purposes would be a future requirement as would similar electronic access and transfer activities with other university libraries.

Including cost implications in the design of the Guelph online catalog forced a divergence from concepts being developed in other organizations. Rather than stressing use of full MARC records for all materials, the emphasis at Guelph was put on a system that would require a minimum of staff-oriented operating or processing procedures. It was agreed that the database must accommodate the non-MARC CODOC format, expanded from documents to include theses, technical reports, and archival records; the serial format of the CUSS list; and the separate special formats for maps and atlases. The extremely high use which nonbook materials have received in libraries providing access through these in-depth but inexpensive automated systems supports insistence on this requirement.

These integrated access and cost questions force a local library to define its relationship and responsibility to networks as well as to decide how much control or standardization is necessary and affordable. In addition, the question must be addressed as to whether online catalogs should be based on the same principles as those that dictated the structure of card catalogs—a location tool as well as a mechanism for relating the works of one author. If this latter is a priority, the size of the database and the structured complexity of interrelationships or connections within it may create a hardware problem. A powerful computer with more storage capacity than originally envisaged may be required to meet the increasing access and response loads from hundreds of terminals both on and off campus. The cost of hardware maintenance is an ongoing charge that cannot be overlooked.

The Geac online catalog which replaced the inquiry system and card catalog in 1983 responded to Guelph's requirements and concerns. Little or no user instruction was needed and the expanded access points increased the efficiency and effectiveness of retrieval. Nonstandard entries were identified in the system so that users could be alerted to the compromises made in the Guelph online catalog as a bibliographic tool.

A third phase in the development of the Guelph online catalog occurred in 1985 when a further joint development agreement with the Geac Corporation added Boolean search strategies to the system. This sophistication also made changes in both orientation requirements and in time spent by students at the terminals accessing the system. The bibliographic instruction programs were forced to become more sophisticated, and individual follow-up sessions were found frequently to be necessary. Library staff developed computer assisted (CAI) modules
using videotext technology to assist students who needed such reinforce-
ment. However, general reaction from students and faculty indicated
that even though they found the new system more complicated, the
retrieval success rate was so high that any complexity was considered to
be of less importance. Time spent by some students in accessing the
system increased marginally, but average accessing time remained at
less than five minutes. It should be noted, however, that the addition of
Boolean searching resulted in the need for a second minicomputer,
equal in power and capacity to the first machine, in order to keep
response time at an acceptable level.

Implications of Online Catalog Development
at the University of Guelph

As has been demonstrated, the impetus for development of the
online catalog came from factors inherent in the University of Guelph
Library and in the university. Early implementation of automated
systems, costs, changing technology, and emphasis on local user needs
were all important considerations. There were also implications for the
library in terms of staffing, organization, and its role in the university
community.

Four separate technical service departments were merged into
two—technical processing and acquisitions—and some bibliographic
functions previously performed in public service departments were
accommodated within the two new departments. Staff members and
classifications also changed. The increasing availability of Library of
Congress copy and the rare changes from Library of Congress standards
or procedures allowed at Guelph placed more emphasis on paraprofes-
sional cataloging. Professional cataloger positions were decreased by 50
percent. Data input by clerical staff became a redundant function and all
input positions were eliminated. With these changes and the depart-
mental mergers, the 1985 staff in the technical services departments
totaled only 60 percent of 1976 numbers, although many positions were
transferred to public service departments in response to the increasing
sophistication and demand for use, access, and retrieval services.
Between 1976 and 1985 the total library staff was reduced by 10 percent
while new acquisitions remained constant and overall library use
increased from 5 to 10 percent per annum.

The issue of local v. a union or centralized catalog environment has
also been reflected in the online catalog implementation at Guelph.
Accepting that the most important single requirement of an online
catalog in a primarily undergraduate university is immediate access to
material needed for teaching or learning purposes, the discovery that a
needed title is at another university is not an essential consideration
unless:
— the status of the book is known — i.e., is it or when will it be available?
— the book can be easily retrieved — i.e., the other university is close
enough to drive to or there is a transit system which will deliver the
book in a few days.

It has been agreed among southern Ontario universities that access
to catalog and status information is more important than the costs that
the standardization of a union catalog would demand. New communi-
cations technology in a network configuration with open system inter-
connection (OSI) concepts responds to the user needs for location—and
status-linked information. Such a network has been established in
Ontario and catalog access between universities is being expanded. This
allows each library to maintain internal bibliographic control at a cost
and using a methodology which the library — not the network—
determines.

The impact of the library developments on the university of
Guelph community, although less measurable, is of equal if not more
significance. It was quite apparent that the library was providing quick
and effective access to its collections within the budget that had been
provided and with no backlog of unprocessed material. Not only had
that access been made available throughout the library, but remote
access was also provided in faculty and administrative offices, in resi-
dence rooms, or from off campus. The credibility of the library as an
information provider and as a responsible major player in the develop-
ing university resource network was enhanced. As a result, library staff
were invited to sit on both technical and educational policy committees
when the university moved to incorporate information technology
goals into its educational and research mission and environment.

The impact of the joint development agreement with the Geac
Corporation should also be mentioned for this has been a very positive
experience. Although a steady stream of visitors toured the library in the
first few years after the online system was implemented, the financial
benefits which accrued to the library more than offset any inconve-
niences which may have obtained.

Future Direction: The Educational Network

Technology as well as financial considerations are again suggest-
ing change in online catalog developments. Such changes will not only
relate to the structure or content of the catalog database but to relationships to other information access tools and resources held in the library in machine readable form. More information, not less, is being requested at the same time as the increase in microcomputers—in faculty and staff offices, in microlabs, in student rooms—is placing heavy demands on the remote access module and on the computing and communications hardware necessary to support it.

In April 1984 the University of Guelph adopted as a primary goal the integration of information technology into all aspects of its academic and research programs. An educational network which will provide access for all students and faculty to a variety of information resources has been defined. The campus data network, based on an integrated voice/data switch, connects the central mainframe computers, several department minicomputers (including two Geac's in the library) and microlaboratories in each college, as well as the individual microcomputer or terminal work station for faculty and staff, and the network connections for each of 5000 residence rooms. Off campus students have been assured access through additional ports on the network.

The library, with its online catalog recognized as the original and primary network resource, is also perceived as the logical location for the center of the educational network. A public pool of terminals on the main floor of the library has been expanded to include microcomputers and printers. The network now provides access to a campus conferencing system (used for both teaching and administrative purposes) and generic CAI modules in addition to the online catalog. Basic statistical and word processing packages will be added this year as will faculty access to student management information.

There are several implications for the library, its catalog, and its other retrieval services. Already there are demands for database searching to be available through the network and it is hoped that it will be added in some way to the bibliographic database. Common menu formats—whether for CAI modules, application packages, conferencing, or the online catalog—have also been requested. The library has been asked to coordinate an orientation program which will include not only access to the bibliographic databases now available in the online catalog but also to the conferencing system and other information modules.

Other technologies are also being studied. High-volume storage media such as the compact disk—which can store data from several media in one physical unit—could also store the online catalog or
sections of it for use elsewhere on campus or off. The possibility of more than 12,000 students all wanting remote access to the online catalog at the same time would place a heavy—and expensive—load on the library facilities. Compact disk technology appears to offer an attractive alternative.

The content of the online catalog is being challenged as faculty members, familiar with electronic journals and abstracting services, see no reason why the present bibliographic records could not be expanded to include abstracts. The table of contents of current journals is considered a valuable addition to the serial records. What would be the cost and hardware implications for such an expansion? How many and what level of staff would be required to provide this additional service? What impact would such changes have on the role of the Guelph Library in the provincial and national resource sharing networks? These and many more questions must be answered.

When the University of Guelph Library moved from offline to online catalog access in 1977 there was no thought that within ten years the technology which made that access possible would also introduce dramatic change to the whole academic process. If the library is to succeed in its new role as the information resource center for an electronic educational network, it must be able to place the online catalog in an environment which is not only changed but which is considerably expanded.

References

The Ohio State University's Library Control System: From Circulation to Subject Access and Authority Control

SUSAN J. LOGAN

The Ohio State University (OSU) is a large, comprehensive university. The nearly 55,000 students may enroll in eighteen colleges, schools, divisions, and may select from more than 200 majors. The courses are taught by more than 3000 faculty who are assisted by a large number of graduate students. To serve the needs of this large campus, the OSU Libraries' collections are housed in twenty-one department libraries, two undergraduate libraries, and the Thompson Main Library.

In 1967 The Ohio State University Libraries conceptualized an online automated circulation system. The university had experienced a dramatic increase in enrollment from 42,246 in 1963/64 to 55,232 in 1968/69. The main library's McBee keysort circulation system no longer functioned. The library no longer sent overdue notices. One library patron's memory of the libraries' service is summed up in the phrase "not on shelf, not checked out." In addition, the libraries' users were frustrated in their attempts to locate available books in this decentralized library system.

LCS, the Library Control System, went online on 16 November 1970 to provide circulation control for what is now 4 million volumes for 1.9 million titles in the Ohio State University Libraries' collection. In 1979, the State Library of Ohio began using the OSU LCS as its circulation system and online catalog. The OSU Law Library began using the online catalog in 1986.

LCS shares the computing resource of an Amdahl V8 computer with other administrative functions of the university, including

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computer-based instruction, personnel data records, student records, alumni records, etc. The computer supports approximately 700 terminals of which 213 are dedicated to LCS and 115 to public use terminals. LCS has eight dial access ports for those who wish to access the online catalog via terminals or microcomputers from home or office.

The LCS Design

The initial design of LCS has allowed, even encouraged, the gradual enhancement into an online catalog. The libraries' requirement for the new circulation system was to eliminate the limitations of the decentralized library using the old circulation system. Innovative features included: (1) online updating of circulation transactions which resulted in immediately available current circulation stats; (2) online remote query for known item searches by call number, title, or author/title; and (3) online access to the entire OSU Libraries shelflist in the short record form. The IBM programmers chose to make LCS modular which has simplified the revision of the system.

LCS was designed as an inventory control system for all titles held by the libraries. The short bibliographic records, now called location records, were converted from the shelflist and later extracted from the OCLC MARC Subscription Service tape records. The location records provide call number, author, title, edition statement, publication date, copies, and holding locations for each title held by the libraries. These short records, which may be compared to a title entry in a finding list, can be searched and displayed on LCS by author/title, title, author, and call number (the original circulation system has been described in the literature).¹

When the OSU Libraries' administration realized that OCLC would not have a public subject search capability, in 1976 the decision was made to upgrade the LCS short bibliographic records to full records and to provide subject search, which was considered adequate to create an online catalog.² In 1977, the decision was modified to require authority control and see and see also reference displays before LCS would be considered the online catalog.

The first terminal was made available to the libraries' public in January 1975. Sixteen terminals were available in 1978 when subject access was added to LCS. By July 1981, 115 public-use terminals were available. The OSU Libraries accepted LCS as the online catalog 1 July 1982 and on that date stopped creating and filing new catalog cards for most of the collection.
Early Subject Access

In 1974 LCS was modified to include an index of call numbers assigned to titles entered in the file. This was called the shelf-position index and is searched using the command SPS/. The search displayed records which had the call numbers sequentially adjacent to the entered call number and was used primarily by the copy cataloging staff to shelflist while copy editing on the OCLC cataloging system.

Although the LC classification could not replace completely the subject search provided by the card catalog, several public service librarians used this capability in conjunction with the LCS title search to provide a rudimentary subject access on LCS. The LCS user did a title search using subject words and, if a title was located, the search was continued with a shelf-position search on the call number of the title located. At least one patron created subject access to the OSU collection by using the SPS/ search with a call number secured from an OCLC record. In 1986 approximately 900,000 cataloged titles on LCS continue to have only the location record which does not include subject headings. Thus the shelf-position search is the only "subject" access to these titles. Figure 1 is the current shelf-position search (SPS/) display.

COMMAND: sps/rm216a7571986

RESPONSE:

<table>
<thead>
<tr>
<th>DSL/</th>
<th>CALL NUMBER</th>
<th>AUTHOR</th>
<th>TITLE</th>
<th>DATE</th>
<th>FBL/</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RM214N983</td>
<td></td>
<td>Annals of nutrition</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>RM214N999</td>
<td></td>
<td>NUTRITION REVIEWS</td>
<td>1942</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>RM215L61986</td>
<td>Lewis, Clark</td>
<td>Nutrition and nutritional</td>
<td>1986</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>RM216A361981</td>
<td>American Diets</td>
<td>Handbook of clinical diet</td>
<td>1981</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>RM216A7571986</td>
<td>Aronson, Virgi</td>
<td>The dietetic technician</td>
<td>1986</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>RM216A76</td>
<td>Aronson, Virgi</td>
<td>Guidebook for nutrition c</td>
<td>1983</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>RM216B3641985</td>
<td>Beck, Mary</td>
<td>Nutrition and dietetics f</td>
<td>1985</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>RM216B42</td>
<td>BELFRAIE, MARY</td>
<td>FACTS ABOUT FOOD</td>
<td>1930</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>RM216B44</td>
<td>BENDER, ARDIS</td>
<td>DIETETIC FOODS.</td>
<td>1968</td>
<td></td>
</tr>
</tbody>
</table>

MORE: PG+ BACK: PG- FOR LOCATION, ENTER: DSL/number FOR FULL CATALOG RECORD, ENTER: FBL/number

Figure 1. Shelf-position Search Display

LCS Subject Index

The 1976 specifications for the LCS subject search used the OSU Libraries card catalog as a model but in a divided form. Thus the subject
search uses the complete subject headings as assigned to titles according to the *Library of Congress Subject Headings* (LCSH). At the time the specifications were written, no online catalogs existed with subject access which could be emulated, and the OSU Libraries chose not to devote the personnel and time to design a new type of subject search. The eight-page requirements document was created by one librarian and one programmer in just over one month.

The LCS subject file was created in June 1978 by extracting the subject headings (fields tagged 6xx) from the full catalog records on LCS. (The original subjects were from the records cataloged by OSU on OCLC from January 1974 to June 1978 and received on the OCLC MARC Subscription Service which was applied to the LCS location records to secure the full catalog records.) A “sort form” was created for each subject by converting all lowercase characters to uppercase and by dropping punctuation and extra spaces. The subjects were then sorted, and each unique subject was assigned a number which replaced the subject in each of the appropriate catalog records. (Each subdivided subject was considered a unique subject.) At the same time, the title number of each catalog record that was assigned the subject was linked to the subject record which allows the global change of a subject in the online catalog. The 1984 addition of the *see* and *see also* references to the index will be discussed later.

**LCS Subject Search**

When a subject search is desired, the user enters the three character command SUB/, which specifies a search transaction and qualifies the type of search followed by the desired subject. The subject requested may be a full subject heading, the initial part of the subject heading, or a word of interest. The user who enters the subject heading or the first part of a subject heading is likely to be more successful than the user who types just any word. The subject search request displays an alphabetical segment of the subject index beginning with the subject requested (see fig. 2). The requested term appears on line one followed by subjects that fall alphabetically after the desired subject and which are often subdivided versions of the same heading. The number of items to which the subject is assigned precedes the subject heading on each display line. The prompt on the next to the last line “MORE: PS+ BACK: PS—” instructs the user how to browse the subject index.

The cataloging staff may modify the search to secure a display (see fig. 3) which has more information than the public display. The “heading number” assigned to each heading is shown preceding the subject. It
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Command: sub/nutrition

Response:

TBL/ ITEMS -------------------------- SUBJECTS -------------------------- SAL/
1  764 Nutrition
2   7 * Nutrition--ABSTRACTS
3   3 * Nutrition--Abstracts--Periodicals
    * Nutrition--Aging effect
5   116337 SEARCH UNDER: Aging--Nutritional aspects
6   6 Nutrition and dental health
7   2 Nutrition and dental health--United States
    * Nutrition and state
9   5218 SEARCH UNDER: Nutrition policy

MORE: PS+ BACK: PS- FOR TITLES, ENTER: TBL/number
FOR NOTES OR RELATED SUBJECTS (ONLY WHEN NUMBER IS AT RIGHT), ENTER: SAL/number

Figure 2. LCS Subject Index Display

is these numbers which are stored in the catalog record to identify the
text of the associated subject. These numbers also link the catalog record
to the heading in the subject index display. An asterisk preceding a
heading indicates that it has not been verified by a cataloger as “cor-
correct.” Specifying the status of the heading was necessary because many
of the records added to the LCS files had been created long before the
completion of the Anglo-American Cataloging Rules, second edition
(AACR2) and the creation of the LCS subject index.

Command: sub/nutrition/all

Response:

TBL/ ITEMS -------------------------- SUBJECTS -------------------------- SAL/
1  764 264 Nutrition
2   7 23019 * Nutrition--ABSTRACTS
3   3 1384247 * Nutrition--Abstracts--Periodicals
    1853888 * Nutrition--Aging effect
5   116337 SEARCH UNDER: Aging--Nutritional aspects
6   6 106473 Nutrition and dental health
7   2 1935136 Nutrition and dental health--United States
    1885787 * Nutrition and state
9   5218 SEARCH UNDER: Nutrition policy

MORE: PS+ BACK: PS- FOR TITLES, ENTER: TBL/number
FOR NOTES OR RELATED SUBJECTS (ONLY WHEN NUMBER IS AT RIGHT), ENTER: SAL/number

Figure 3. LCS Staff Authority Index Display

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The original 1978 design was similar to Dialog's EXPAND or SDC's NEIGHBOR commands which display a segment of an alphabetical file before and after the entered term (see fig. 4). This display compensated for the errors in the subject headings that were present due to the benign neglect of the OCLC records on the archive tape and illustrated the organization of the file. The proposal to change this display was made after observing that users often were confused when the subject they typed was not the first subject displayed. Many of the incorrect subject headings had been corrected between 1978 and 1986 thus reducing the need to see the subject which immediately precedes the one entered.

**Figure 4. Original LCS Subject Index Display**

The design staff considered providing a search which would bypass the subject index and would respond with a list of titles with the specified subject heading. However, three reasons not to provide this capability were identified: (1) it was thought that the user would be unlikely to enter the precise subject, (2) the number of incorrect subjects due to typographical errors in the old records would restrict patron access to these records, and (3) the library patron should be aware of the subdivided subjects that can be a valuable resource. This last reason was associated with the inability to determine how to include the titles
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associated with the subdivided subject headings with the undivided subject in a clear, efficient manner for both the user and the system.

The titles to which the subject is assigned are viewed by entering the three character command TBL/. The titles are sequenced by date of publication in reverse chronological order and then by title (see fig. 5). Arranging the titles by date was selected over an alphabetical arrangement by author since it has been shown that within a subject area library users frequently select by publication date.³

COMMAND: tbl/l
RESPONSE:

SUB/Nutrition
DSL/ LIB 1-8 OF 764 TITLES 1986 1
1 OSU The dietetic technician : effective nutrition Aronson, V 1986 1
2 SL Eat to succeed : the Haas maximum performance Haas, Robe 1986 2
3 OSU Essentials of nutrition and diet therapy / Williams, 1986 3
4 OSU Food and nutrition : customs and culture Fieldhouse 1986 4
5 OSU Foundations of normal and therapeutic nutrition Lankford, 1986 5
6 OSU How to live longer and feel better Wing, Lawr 1986 6
7 OSU Mollen method : a 30-day program to life Mollen, Ar 1986 7
8 OSU Normal and therapeutic nutrition / 1986 8

FOR LOCATION, ENTER: DSL/number FOR FULL CATALOG RECORD, ENTER: FBL/number

Figure 5. Display of Titles for a Subject Heading

The user may then search by line number to view the location record with circulation status of the items (see fig. 6) or the full catalog record (see fig. 7) which will provide alternative subject headings and the call number for browsing with the shelf-position search.

Adding Subject Authority

In December 1981 the subject index was modified to allow the display of "see" references and to include author, uniform title, and series headings.⁴ At this same time the record was expanded to include fields necessary to identify the type of heading, the fields necessary for authority control, and the fields to specify and qualify the links to the "see references" and to the headings that had a "see also" and/or "see also from" relationship.

The updating of these expanded records was completed primarily from processing the Library of Congress subject and name authority
command: ds1/1

response:

CALL NUMBER: RM216A7571986
AUTHOR: Aronson, Virginia
TITLE: The dietetic technician: effective nutrition counseling
DATE: 1986

LINE LOCATION COPY LOAN STATUS
1 HOM 1 3wk available

FULL CATALOG INFO: F8L/1

Figure 6. LCS Location Record

command: F8L/1

response:

RM216A7571986
Aronson, Virginia.
The dietetic technician: effective nutrition counseling / Virginia Aronson.
SUB: 1. Diet therapy 2. Nutrition
LC CARD #: 85-611D TITLE #: 3745194 OCLC #: 11918178 &1q860618

PAGE 1 END

Figure 7. Full Catalog Record

master tapes. The LCS-created “sort form” for each heading on the LC authority tapes was compared to the “sort form” for the LCS headings. When an LC heading was found on LCS, the LC authority record was edited and added to the LCS record. LCS now includes 2 million assigned name, subject, series, and uniform title headings of which 621,737 are assigned subject headings. An assigned heading is considered “verified” if it is in AACR2 form or if it conforms to LCSH. Of the assigned subject headings, 54 percent (336,168) are “verified.” Of all assigned subject headings, 41,214 or 6.6 percent were “verified” using
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the Library of Congress subject authority master for September 1981. In addition, 70,576 "see also" links and 48,737 "see" references were added to LCS from the 1981 subject master.

All new headings from new OCLC cataloging performed by the Library of Congress or the OSU Libraries are added to the headings file as "verified" headings. At this time very few "see" references and "see also" heading links are added to LCS under the assumption that new LC authority tapes will be processed against LCS in the future. The "see" references and "see also" links which are not expected from the Library of Congress authority tapes are added to LCS by staff in the cataloging department. Although the programming request has been written to process more recent LC authority tapes, other LCS projects have been given priority. The "see" references—which are labeled "SEARCH UNDER:"—display in the subject index in the alphabetically correct sequence (see fig. 2).

The LCS subject search was designed so that the user could enter any desired subject and receive a response. The examples which are included with this article illustrate only searches that matched the LC subject heading exactly. If the requested term is not located in the subject index, the response on line 1 includes the note "NOTHING WAS FOUND UNDER:" followed by the requested term. The subjects on the preceding page and those subjects and/or "see references" following in the display are alphabetically adjacent to the requested term. Thus, the user receives a response which will encourage the evaluation of the typed request as it relates to the subjects around it. Frequently, a desired subject appears on the same screen, and the user searches the more relevant or correct subject.

The LCS user may request the list of titles associated with a subject by entering the TBL/ command followed by the line number in front of the "SEARCH UNDER" reference. However, this will not provide the opportunity to view the subdivided subjects that are available in the index in the alphabetically correct location for the subject heading (see fig. 8).

The "see also" references, notes, and suggested classification numbers are displayed only when the user requests them by entering the command SAL/ followed by the line number of the subject for which related subjects are desired (see fig. 2 leading to fig. 9). In this display, the number of titles associated with each "see also" heading (excluding the titles associated with subdivided versions of the heading) is provided to the right of each subject. The user must enter a new subject search if one of the "see also" subjects is of interest. The Libraries' Committee for
**Command:** sub/aging—nutritional aspects

**Response:**

<table>
<thead>
<tr>
<th>TBL/ ITEMS</th>
<th>SUBJECTS</th>
<th>SAL/</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aging—Nutritional aspects</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Aging—Nutritional aspects—Bibliography.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Aging—Nutritional aspects—CONGRESSES</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Aging—Periodicals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Aging persons</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>SEARCH UNDER: Aged</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Aging—INDEXES</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Aging—Juvenile literature</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Aging—Longitudinal studies.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 8. LCS Subject Index Display**

An On-line Catalog is currently reviewing the content and format of the SAL/ display for possible revision.

What fields should be displayed to the libraries' users and in what order was discussed at length. The interest that many users have shown in "browsing the shelves" and the normal brevity of that field resulted in displaying it first along with the prompt "(SEARCH WITH SPS/)". The subjects that have a "see also" relationship are displayed next, because they were included in the OSU Libraries' card catalog. The "see also" notes followed. The subjects that had a "see also from" relationship were omitted from the public display because the repetition of the same subject in two separate sequences would be confusing, and the librarians did not want the "see also" and "see also from" headings interfiled because they used the distinction in their work. No consideration was given to including the "see" references in the public display. All of the fields in the authority record are available to the staff by modifying the search request. The cataloger's version of the display in figure 9 is in the appendix.

**Use of Subject Search**

Although the initial library policy was not to promote the subject search, within one year, by June 1979, Norden and Lawrence reported that subject searches were 9.3 percent of the searches of choice. Those transactions which specified a type of search—e.g., author, subject,
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COMMAND: sal/1

RESPONSE:

Nutrition
POSSIBLE BROWSING NUMBER(S): Home economics, TX341-641; Personal hygiene
RA784: Physiology, QP141-185.3 (SEARCH WITH SPS/)

SEARCH ALSO UNDER:
Absorption (Physiology) (12 TITLES)
Amino acids in human nutrition (1 TITLE)
Animal nutrition (76 TITLES)
Antibiotics in nutrition (3 TITLES)
Chromium in human nutrition
Deficiency diseases (15 TITLES)

PAGE 1. MORE: PG+ TO RETURN TO SUBJECTS, ENTER: PS1

Nutrition
SEARCH ALSO UNDER:
Diet (224 TITLES)
Dietary supplements (12 TITLES)
Digestion (30 TITLES)
Elemental diet (1 TITLE)
Food (298 TITLES)
Food habits (73 TITLES)
Food preferences (7 TITLES)
Lipids in nutrition (7 TITLES)

PAGE 2. MORE: PG+ BACK: PG- TO RETURN TO SUBJECTS, ENTER: PS1

Nutrition
SEARCH ALSO UNDER:
Vitamins (51 TITLES)
Vitamins in human nutrition (26 TITLES)
SEARCH ALSO UNDER: Subdivision Nutrition under subjects, e.g. Astronauts--Nutrition; also subdivision Nutritional aspects under diseases, e.g. Nutritional aspects

PAGE 5. BACK: PG- TO RETURN TO SUBJECTS, ENTER: PS1

Figure 9. Public Search Also Under Display

title—were defined as searches of choice. In 1985/86, the 868,800 subject searches accounted for 30 percent of the searches of choice at the public search terminals. In 1985/86, 129,300 SAL/ commands (“Search also” searches) were entered from the public search terminals.

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In their survey of users of the LCS subject search, Ludy and Van Pulis have determined that the search the user entered found an exact or close match 69 percent of the time. For 13 percent of the searches entered, a "SEARCH UNDER:" reference was displayed. The inclusion of the "see" and "see also" structure has increased the success rate of the subject searches to 82 percent.

**Evaluation**

Although the LCS subject search uses the same vocabulary as the card catalog—i.e., the Library of Congress Subject Headings—the LCS subject search is an improvement over the card catalog. LCS ignores punctuation such as parentheses and commas so that a user is not required to be aware of the punctuation or to enter these correctly. If the punctuation is entered, it is ignored by LCS. Users can move around the alphabet changing their minds about the subject. Once a subject display has been retrieved, the users may browse forward or backward following the prompts at the bottom of the screen to identify the desired heading, and the users frequently enter the page-turning commands to browse the list of headings. LCS indicates the number of titles to which the heading was assigned. A list of titles can be requested by entering the line number of the "see" reference with the same ease that the titles can be selected from the actual heading.

The subject searches (SUB/) on LCS average .31 of a second in the central processing unit. The request to list the titles associated (TBL/) with a subject average .38 of a second per request. The request to view the "search also under" headings (SAL/) averages .45 of a second per request. This minimal use of the computer resource, considering the number of subject searches performed and the total activity on LCS, is important. The quick responses are especially important for the OSU Libraries and such response occurs in part because the LCS subject search is not a Boolean search.

**Future Enhancements**

What does the future hold for improving LCS subject access? The first enhancement should be to identify from the transaction log the subject searches that responded with no titles. These requests would be examined by a cataloger and added, if appropriate, as additional references to established subject headings.

A second enhancement would be automatically to manipulate the search if no heading or reference is found that matches the request. This
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modification would be of two kinds. First, LCS could invert the entered words and retry the search, thus "History of the United States" would locate a successful heading under "United States, History of the." If the inversion was not successful, then passing the entered words against a database to check spelling might be appropriate.

Conclusion

The OSU Libraries online catalog subject access has roots in the card catalog. Technology has been applied to enhance the card catalog capabilities in subject searches of a decentralized library's online catalog. OSU Libraries will observe and evaluate online catalogs in other libraries with similar activity levels to identify enhancements for LCS that will improve subject searches for the libraries' users.
Appendix
LCS Authority Display
(or Staff Search Also Under Display)

Nutrition 264
12 SEE ALSO:
13 1391706 Survival and emergency rations (2)
14 48772 Trace elements in nutrition (12)
15 147006 Unsaturated fatty acids in human nutrition (2)
16 190247 Vitamin D in human nutrition (1)
17 56677 Vitamins (51)
18 46756 Vitamins in human nutrition (26)
19 (360) subdivision Nutrition under subjects, e.g., Astronauts—Nutrition;
also subdivision Nutritional aspects under diseases, e.g., Cancer—

PG2. ENTER PG1 FOR PRECEDING PAGE; ENTER PG3 FOR NEXT PAGE.

Nutrition 264
(360) Nutritional aspects; Cardiovascular system—Diseases—Nutritional aspects
24 SEE ALSO FROM: 19
25 63969 Deficiency diseases (15)
26 12063 Diet (224)
27 29466 Digestion (30)
28 10219 Food (296)
29 1207 Food habits (73)
30 30451 Health (210)

PG3. ENTER PG2 FOR PRECEDING PAGE; ENTER PG1 FOR NEXT PAGE.

Nutrition 264
02 SEE ALSO FROM:
03 9361 Metabolism (94)
04 165130 Orthomolecular therapy (12)
05 13388 Physiology (196)
06 4515 Therapeutics (170)
PG1 END. ENTER PG2 FOR PRECEDING PAGE.

Nutrition (1981)
02 264 SUB: 764
03 (053) Home economics, TX341-641; Personal hygiene, RA794; Physiology, QP41-
05 1895777 Alimentation
07 1965227 Dietetics
08 SEE ALSO: 32
09 55441 Absorption (Physiology) (12)
10 1854052 Amino acids in human nutrition (1)
PG1. ENTER PG2 FOR NEXT PAGE.
<table>
<thead>
<tr>
<th>Nutritional Focus</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition</td>
<td>264</td>
</tr>
</tbody>
</table>

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12 SEE ALSO:
13 4403 Animal nutrition (76)
14 197866 Antibiotics in nutrition (3)
15 239056 Chromium in human nutrition (1)
16 63969 Deficiency diseases (15)
17 1263 Diet (224)
18 290590 Dietary supplements (12)
19 25466 Digestion (30)
20 1800263 Elemental diet (1)

PG2. ENTER PG1 FOR PRECEDING PAGE; ENTER PG3 FOR NEXT PAGE.

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22 SEE ALSO:
23 10219 Food (298)
24 1207 Food habits (73)
25 160318 Food preferences (7)
26 8796 Lipids in nutrition (7)
27 22690 Macronutrition (53)
28 9361 Metabolism (94)
29 112670 Milk as food (6)
30 1370244 Minerals in nutrition (2)

PG3. ENTER PG2 FOR PRECEDING PAGE; ENTER PG+ FOR NEXT PAGE.

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02 SEE ALSO:
03 56678 Minerals in the body (12)
04 36015 Parenteral feeding (19)
05 6623 Proteins in human nutrition (19)
06 1660956 Selenium in human nutrition (2)
07 127812 Solids and nutrition (2)
08 249516 Sugars in human nutrition (1)
09 14549 Sulphur in nutrition (2)
10 191793 Surgery—Nutritional aspects (4)

PG1. ENTER PG- FOR PRECEDING PAGE; ENTER PG2 FOR NEXT PAGE.
References


7. Ibid.


9. Ludy, Lorene E., and Van Pulis, Noelle. "Subject Searching in an Online Catalog with Authority Control." (In preparation. Contact the authors at The Ohio State University.)
Suggested Guidelines for Screen Layouts and Design of Online Catalogs

JOSEPH R. MATTHEWS

Central to the concept of an online catalog is the display of bibliographic and other information on a CRT screen. Yet each designer of the online catalog has developed a fairly unique approach to the issues of layout, content, and sequence of data, typography, spacing, punctuation, and vocabulary. Good computer systems must accommodate the ways that people read and understand CRT terminal displays.

As online catalogs proliferate and users move from system to system it becomes crucial that the user of the online catalog be presented with screens that are relatively similar in layout and content. This has important implications both for the system designer and for the user of the online catalog. For the system designer, familiar and relatively similar screen displays mean that the user will spend less time reading the screen. Thus the time between the entry of command/choices will be shorter. This means that the online catalog, an expensive resource, has the potential for more user transactions per hour. For the user, familiar screens mean less time will be needed to (re)learn the use of an online catalog in a variety of library settings.

The following preliminary guidelines for screen layout and design are presented in an effort to spark discussion and become a focus for consensus building. A "guideline" is a range of acceptable options that gets the library profession closer to an online catalog that works under a variety of circumstances. Guidelines are not meant to be set in concrete but are meant to evolve as the available data and research gets better. The

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guidelines will and should change as we learn more. Good screen guidelines must emphasize:

—*consistent* display formats so the user knows where to look for information;
—*consistent* labeling of information;
—the value of *brevity*—displaying no more data than needed by the user; and
—*efficient information assimilation* by the user.

**Consistency**—the foundation of systems that are easy to learn, use, and remember—allows the user to form a simple conceptual model of the online catalog. When the designer’s conceptual model of the online catalog closely parallels the model developed by the user through use of the system, the system can then be called user friendly.

**Brevity**—acknowledges that the human user is limited in the amount of information that can be absorbed in a given period of time. Ignoring this limitation will result in increased frustration and user errors. Overall density, often expressed as a percentage of the total character spaces available, measures the number of characters displayed. Local density, usually manipulated by altering line spacing, is an indicator of the number of filled spaces near each character. Low density numbers should mean good user comprehension.

**Compatibility**—another desirable characteristic—minimizes the amount of information recoding that must be done by the user. Good compatibility ensures efficient information assimilation by the user. Related data should be grouped or “chunked” together. The layout complexity of a display should follow a predictable visual scheme.

Some general guidelines are presented followed by some specific guidelines that relate to different types of online catalog displays. References are given to indicate the degree of support that prior research, experience, and the synthesis of other work related to displays give to these guidelines. Both in substance and style the following guidelines draw heavily from Smith and Aucella.

**Label Guidelines**

1. *Labels Should Be Uppercase.* Display labels in uppercase only.
2. *Labels Should Be Words, Not Abbreviations.*
3. *Every Variable Should Be Labeled.* Every variable or data element should have a distinct and meaningful name. Use of jargon should be avoided, including librarianese. The choice of labels should be driven by what the majority of users call various data elements, not
what librarians think has value. For example, do users know what is meant by "IMPRINT"?

4. **Labels Should Be Right Justified.** Labels should be right justified and placed to the left of the data field.

5. **Separate Labels.** Labels should be separated from data fields by a colon (:) and at least one blank space.

6. **Label Length.** The amount of space provided for labels should be at least twelve characters and no more than twenty characters.

7. **Labels for Information Displayed in Columns.** Columns should be clearly identified. There are several options for displaying column labels (see fig. 1):
   a. UPPERCASE only
   b. Underlined UPPERCASE
   c. Uppercase with hyphens—e.g., ---- UPPERCASE ----
   d. Uppercase in REVERSE VIDEO

At this time there are no clear research results to indicate which type of label to use for information displayed in columns. In the face of a lack of research, all caps with underscore is recommended. Color displays may also help to solve this problem.

**General Text Guidelines**

1. **Arrange Data Logically.** Arrange information in logical groups functionally.

2. **Mix Upper and Lowercase Text.** To improve legibility and help differentiate text from labels, general text should be displayed in mixed upper and lowercase with conventional use of capitalization—i.e., to start sentences, to indicate proper nouns and acronyms, etc. Should indexes which are not stored in uppercase only be displayed in uppercase only? Research suggests not.

3. **End Sentences with a Period.** Every sentence should end with a period.

4. **Little or No Hyphenation of Text.** Words should not be broken by hyphenation. Lines should be broken at words rather than splitting a word in two. Unjustified text lines are just as legible as right margin justified text. Ragged right-hand margins are also probably easier to do than right-justified margins.

5. **Left Justified Text.** Text should be left justified. The label should be right justified, followed by a colon, then a space, and then the text. There should be two parallel lines if you look straight down the middle of the display. With labels right justified and text left justi-
JOSEPH MATTHEWS

1. **ALL CAPS**, for example:

<table>
<thead>
<tr>
<th>LINE #</th>
<th>AUTHOR</th>
<th>TITLE</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stone, Allan A.</td>
<td>The abnormal personality</td>
<td>1976</td>
</tr>
<tr>
<td>2</td>
<td>Stone, Albert E.</td>
<td>The innocent eye: childhood</td>
<td>1975</td>
</tr>
<tr>
<td>3</td>
<td>Stone, Albert E.</td>
<td>Twentieth century interc</td>
<td>1977</td>
</tr>
<tr>
<td>4</td>
<td>Gawain and the Green Knigh</td>
<td>Sir Gawain and the Green</td>
<td>1968</td>
</tr>
</tbody>
</table>

2. **ALL CAPS WITH UNDERSCORE**, for example:

<table>
<thead>
<tr>
<th>LINE #</th>
<th>AUTHOR</th>
<th>TITLE</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stone, Allan A.</td>
<td>The abnormal personality</td>
<td>1976</td>
</tr>
<tr>
<td>2</td>
<td>Stone, Albert E.</td>
<td>The innocent eye: childhood</td>
<td>1975</td>
</tr>
<tr>
<td>3</td>
<td>Stone, Albert E.</td>
<td>Twentieth century interc</td>
<td>1977</td>
</tr>
<tr>
<td>4</td>
<td>Gawain and the Green Knigh</td>
<td>Sir Gawain and the Green</td>
<td>1968</td>
</tr>
</tbody>
</table>

3. ----- **ALL CAPS** ----- (WITH HYPHENS), for example:

<table>
<thead>
<tr>
<th>LINE #</th>
<th>AUTHOR</th>
<th>TITLE</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stone, Allan A.</td>
<td>The abnormal personality</td>
<td>1976</td>
</tr>
<tr>
<td>2</td>
<td>Stone, Albert E.</td>
<td>The innocent eye: childhood</td>
<td>1975</td>
</tr>
<tr>
<td>3</td>
<td>Stone, Albert E.</td>
<td>Twentieth century interc</td>
<td>1977</td>
</tr>
<tr>
<td>4</td>
<td>Gawain and the Green Knigh</td>
<td>Sir Gawain and the Green</td>
<td>1968</td>
</tr>
</tbody>
</table>

4. **ALL CAPS (WITH REVERSE VIDEO)**, for example:

<table>
<thead>
<tr>
<th>LINE #</th>
<th>AUTHOR</th>
<th>TITLE</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stone, Allan A.</td>
<td>The abnormal personality</td>
<td>1976</td>
</tr>
<tr>
<td>2</td>
<td>Stone, Albert E.</td>
<td>The innocent eye: childhood</td>
<td>1975</td>
</tr>
<tr>
<td>3</td>
<td>Stone, Albert E.</td>
<td>Twentieth century interc</td>
<td>1977</td>
</tr>
<tr>
<td>4</td>
<td>Gawain and the Green Knigh</td>
<td>Sir Gawain and the Green</td>
<td>1968</td>
</tr>
</tbody>
</table>

Figure 1. Options for Tabular Labels

- fied, you have jagged edges on the outer margins and in the middle you have symmetry. Subject headings should be viewed as text—i.e., presented as upper and lowercase.

6. **Text Width of 55 Characters.** Text should include no more than 55-60 characters per line.15

7. **Highlighting.** The variable textual information should be highlighted with the labels displayed in normal or dim intensity.16

8. **Paragraphs.** Paragraphs should be no longer than four lines each. Paragraphs should be separated by a single blank line.17
Instructional Text Guidelines

Text for instructions, directions, help screens, and options should follow these guidelines:

1. Simple Sentence Structure. Short, simple sentences should be used.18
2. Affirmative Sentences. Affirmative rather than negative statements should be used. Tell the user what to do not what to avoid.19
3. Active Voice. Sentences should be in the active voice because active voice sentences are easier to understand.20
4. Temporal Sequence. The word order of sentences describing a sequence of actions should correspond to the sequence of activities.21
   
   Examples: (Good) Press RETURN to start a search.
   (Bad) To start a search, press RETURN.

Don't ask the user to transpose the instruction.

5. Use Complete Words. Complete words—not contractions or short forms of a word—should be used.22
6. Avoid Jargon. Words used should be familiar to the user and avoid the jargon of librarians and computer programmers.23 For example, in displays of authority information, the records related to a controlled vocabulary heading have been referred to as “references,” “titles,” “records,” “items,” “citations,” and “papers.” Are any of these terms more or less intelligible to users? More work is needed in this area.
7. Consistent Wording. Word usage should be consistent, especially for terminology pertaining to the online catalog.24 Example: If the word “screen” is to be used, then synonyms such as frame, display, etc. should be avoided. We may need to develop a glossary so that we can call things by the same names regardless of the system we are in. We need to get away from the “not invented here” syndrome—i.e., the belief that vocabulary that originated somewhere else can never be appropriate for my special needs. The glossary contained in Hildreth’s book is a good starting point.
8. Information Content. Only information essential to the user’s needs should be displayed. Simplify all screens. However, all data pertinent to a particular information need—e.g., location and status information—should be displayed on the same screen.25
9. Information Density. The total amount of information to be displayed at any one time should be carefully controlled. No more than 30 percent of available character spaces should be used—15 percent is recommended.26 Users always perceive that the screen is more filled
with information than it actually is. Crawford et al., in a forthcoming book, are measuring the information density of various online catalog screen designs.

Screen Layout Guidelines

1. **Identify Screens.** For screen or page-based systems, every screen should display the user's input that led to the current screen. If this information is not incorporated as a part of the system's response to the user, it should be displayed in the upper right-hand corner of the screen.

2. **Organization of Data.** The organization and location of displayed data elements should be standardized. This permits the user to develop spatial expectations. Data should be presented using spacing, grouping, and columns to produce an orderly and legible display.

3. **Screen Segments.** The screen should be divided into three segments (top, middle, and bottom) with each segment reserved for specific functions. For example, the top of the screen usually shows how the user got the present screen, the middle of the screen presents the current information, and the bottom of the screen is typically reserved for the display of options available to the user.

4. **Dashed Lines.** Dashed lines may be used to segment the screen.

The following sections give specific guidelines for the layout of a number of different types of screen displays. Guidelines that apply to more than one type of display are repeated.

Screen Layout—Authority Display

There is little guidance to date for this area. For example, should the records associated with a heading precede or follow that heading? Should the main heading (material preceding the first --) be repeated or should it be displayed once with the subheadings indented on the following lines? There are some things we do know however:

1. **Line Numbers.** Lists of items continued on the next page (scrolled) should be numbered relative to the first item on the initial page. Leading zeros in line numbers should not be used. Line numbers should start with the number “1” not “0.” On some systems, you look at ten items (numbered one through ten) then go to the next page for ten more and they are numbered one through ten again; you go to the third page and they are numbered one through ten. How can the user
Guidelines

keep track? That is the issue. Constantly increasing numbers are recommended.

2. **Order of Items.** Items in a list should be arranged in some recognizable and useful order such as chronological, alphabetical, or degree of importance. Last-in-first-out is generally not a useful display sequence.

3. **Data Elements Included.** Data elements to be included in a multiple line (record) display are:
   - Line number
   - Authority heading
   - Number of related records

   What sequence these elements should appear in has not been addressed though it is assumed that the line number should come first.

4. **Tabular Displays.** When multiple data elements appear on a single line—e.g., line number, authority heading(s), number of related records—the data elements should be broken into separate blocks—tabular display—and not run together and separated with slashes.

5. **Label Column Displays.** To reduce misunderstandings and increase efficient information assimilation by the user, all columns should have a column heading label. A sample authority display that incorporates these design guidelines is shown in figure 2.

Screen Layout—Multiple Line Display

1. **Line Numbers.** Lists of items continued on the next page (scrolled) should be numbered relative to the first item on the initial page.

2. **Order of Items.** Items in a list should be arranged in some recognizable and useful order, such as chronological, alphabetical, or degree of importance.

3. **Data Elements Included.** Data elements to be included in a multiple line (record) display are:
   - Line number
   - First (N) characters of the author
   - First (N) characters of the title
   - Year published

   Note: in a sample of eighteen online catalogs, seventeen include the title (truncated), fifteen the author (truncated), thirteen the line number, seven the call number, nine the year, four the location, two the publisher, and one the record ID. Perhaps the data elements to be included vary by type of search. For example, for an author search, assuming the author's name being searched is displayed once, the
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BROWSING SUBJECT HEADINGS: Library

<table>
<thead>
<tr>
<th>LINE</th>
<th>TITLES</th>
<th>SUBJET HEADINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14</td>
<td>Library Administraion</td>
</tr>
<tr>
<td>2</td>
<td>23</td>
<td>Library Architecture</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>Library Associations</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
<td>Congresses</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>Directories</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>Library Buildings</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>Library Catalogs</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>Card Catalogs</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td>COM Catalogs</td>
</tr>
<tr>
<td>10</td>
<td>8</td>
<td>Online Catalogs</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>Library Education</td>
</tr>
<tr>
<td>12</td>
<td>3</td>
<td>Canada History</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>US History</td>
</tr>
<tr>
<td>14</td>
<td>36</td>
<td>Libraries, University and college</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>Acquisitions</td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td>Addresses, essays and lectures</td>
</tr>
<tr>
<td>17</td>
<td>9</td>
<td>Administration</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>Automation</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>Case studies</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>Collected works</td>
</tr>
</tbody>
</table>

More records may be seen on the next screen.

CHOICE: __

Select the NUMBER of the item you want to see, or
N NEXT SCREEN    H HELP
P PREVIOUS SCREEN

Figure 2. Sample Authority Display

data elements to be displayed in tabular form include line number, title, and year published (perhaps call number). For a title or author/title search, the data elements to be displayed in tabular form include: line number, author, title, and year published.

4. *Tabular Displays*. When multiple data elements appear on a single line—e.g., line number, author (truncated), title (truncated), year, etc.—the data elements should be broken into separate blocks—tabular display—and not run together and separated with slashes. 38

5. *Label Column Displays*. To reduce misunderstandings and increase efficient information assimilation by the user, all columns should have a column heading label. 39

Figure 3 provides an illustration of a sample multiple line display that incorporates these guidelines.

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## Guidelines

**SUBJECT SEARCH: Economic** RETRIEVED 31 RECORDS

<table>
<thead>
<tr>
<th>LINE #</th>
<th>AUTHOR</th>
<th>TITLE (Partial)</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blaug, Mark</td>
<td>Economic Theory in retrospect</td>
<td>1968</td>
</tr>
<tr>
<td>2</td>
<td>Clark, Colin</td>
<td>The economic development of Weste</td>
<td>1959</td>
</tr>
<tr>
<td>3</td>
<td>Clough, Shepard</td>
<td>The economic development of Weste</td>
<td>1959</td>
</tr>
<tr>
<td>4</td>
<td>Commoner, Barry</td>
<td>The poverty of power: energy and</td>
<td>1976</td>
</tr>
<tr>
<td>5</td>
<td>Dobb, Maurice</td>
<td>Studies in the development of cap</td>
<td>1947</td>
</tr>
<tr>
<td>6</td>
<td>Faulkner, Harold</td>
<td>American economic history</td>
<td>1960</td>
</tr>
<tr>
<td>7</td>
<td>Galbraith, John</td>
<td>The age of uncertainty</td>
<td>1977</td>
</tr>
<tr>
<td>8</td>
<td>Galbraith, John</td>
<td>Money whence it came, where it we</td>
<td>1975</td>
</tr>
<tr>
<td>9</td>
<td>Gould, John Devi</td>
<td>Economic growth in history: surve</td>
<td>1972</td>
</tr>
<tr>
<td>10</td>
<td>Heibrouer, Ronald</td>
<td>The making of economic society/R</td>
<td>1980</td>
</tr>
<tr>
<td>11</td>
<td>Hicks, John Richa</td>
<td>A theory of economic history</td>
<td>1969</td>
</tr>
<tr>
<td>12</td>
<td>Kenwood, A.G.</td>
<td>The growth of the international e</td>
<td>1971</td>
</tr>
<tr>
<td>13</td>
<td>Levy, Lester S</td>
<td>American economic development gro</td>
<td>1962</td>
</tr>
<tr>
<td>14</td>
<td>McClelland, David</td>
<td>The achieving society</td>
<td>1961</td>
</tr>
<tr>
<td>15</td>
<td>Polanyi, Karl</td>
<td>The livelihood of man, edited by</td>
<td>1977</td>
</tr>
</tbody>
</table>

More records may be seen on the next screen.

**CHOICE:**

Select the NUMBER of the item you want to see, or

N NEXT SCREEN  H HELP

P PREVIOUS SCREEN

Figure 3. Sample Multiple Line Display

### Screen Layout—Single Brief Record Display

This display provides a brief record and one or more records may be displayed on a single screen. If a search retrieves a single record, the system should automatically display the record in a (default) single brief record display. Most systems require the user to enter another character and hit RETURN even if there is only one choice to be displayed.

1. **Layout.** The layout or format of a brief record should not be the traditional 3 x 5 card catalog format but rather a structured, labeled format. Note: in a sample of fourteen online catalogs, seven use a structured labeled format.

2. **Label Every Variable.** Every variable or data element should have a distinct and meaningful name. Use of jargon in the labels, including librarianese, should be avoided.

3. **Information Content.** Only information essential to the user's needs should be displayed. A number of observers have suggested that users of the catalog actually use little of the data presented.
Screen Layout—Copy and Status Display

To the extent possible, the use of a tabular layout is recommended. Labels should be capitalized and text should use upper and lowercase characters. A sample brief record display is shown in figure 4.

DISPLAY RECORD NUMBER 7 FROM A SET OF 31 RECORDS.

AUTHOR: J. F. Foster and F. Mowat
CALL NUMBER: TD844 A45 N055

<table>
<thead>
<tr>
<th>BARCODE #</th>
<th>LOCATION</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>123456789</td>
<td>Main</td>
<td>On shelf</td>
</tr>
<tr>
<td>198765432</td>
<td>Branch</td>
<td>Checked out</td>
</tr>
</tbody>
</table>

CHOICE: —
N NEXT SCREEN   H HELP
P PREVIOUS SCREEN

Figure 4. Sample Brief Record Display

Screen Layout—Medium or Full Record Display

This display provides most or all of the full MARC record. (The display may therefore require more than one screen.)

1. Layout. The layout or format of a record should not be the traditional 5 x 5 card catalog format but rather a structured labeled format. And related data—e.g., author and added author entries—should be combined in the display of the online catalog. Note: In a sample of fourteen displays, seven use a structured labeled format.

2. Label Every Variable. Every variable or data element should have a distinct and meaningful name. Use of jargon in the labels, including librarianese, should be avoided.

Figure 5 illustrates a sample full record display using the earlier suggested guidelines.
Guidelines

DISPLAY RECORD NUMBER 7 IN FULL FROM A SET OF 31 RECORDS.

AUTHOR: J. F. Foster and F. Mowat
DESCRIPTION: 265 pages, includes index and bibliography
SUMMARY: This study critically examined the measurement of nitrogen dioxide content in the atmosphere using representatives from both government agencies and private corporations.
SUBJECTS: 1 Nitrogen dioxide
2 Nitrogen dioxide, testing
3 Atmosphere testing
CALL NUMBER: TD844
A45
N055

CHOICE: __
N NEXT SCREEN H HELP
P PREVIOUS SCREEN

Figure 5. Sample Full Record Display

Conclusions

It is possible to develop valid guidelines for the display of bibliographic and related information on the screen of a CRT terminal, and now is the time to do so—before the number of online catalogs grows too large. Some similarity exists now.

The display guidelines should employ principles based on available research. These guidelines should be used consistently whenever a system designer chooses to employ a particular feature or display.

Standard nomenclature is required now to identify and describe the various elements and screens of the online catalog. A standard for the names of different data elements is also needed now. Again, the names should be what a majority of users call a particular data element, not what librarians and system designers think a label should be called.

Research is needed to help determine which of the various data elements—and in which sequence—are needed by users. For example, should a brief display provide author, title, series, publisher, subjects, contents notes or title, series, author, publisher, year, subjects or...? We need to format the display from the user's perspective.
JOSEPH MATTHEWS

References


9. Ibid.


12. Engel, Guidelines for Man/Display Interfaces; and Galitz, Handbook of Screen Format Design.


20. Ibid.
21. Ibid.
22. Galitz, Handbook of Screen Format Design; and Smith, and Aucella, Design Guidelines for the User Interface.
27. Bradford, "Conceptual Differences Between the Display Screen"; and Tinker, Legibility of Print, p. 111.
JOSEPH MATTHEWS


32. Ibid.


40. Frayser, Benjamin Scott. The Effects of Spatial Arrangement, Upper-Lower Case Combinations, and Reverse Video on Patron Response to CRT Displayed Catalog Records. Provo, Utah: Brigham Young University, School of Library and Information Sciences, 1981.


44. Frayser, The Effects of Spatial Arrangement.


Additional References


Guidelines


JOSEPH MATTHEWS


Meads, Jon A. "Friendly or Frivolous?" Datamation (1 April 1985):96-99.


Educating the Online Catalog User:  
A Model Evaluation Study

BRIAN NIELSEN  
BETSY BAKER

An issue which is central to planning for the implementation of online catalog systems in libraries of all types, but which received little notice in the literature of the early 1980s on online catalogs, is that of the role of public services staff in the management planning process.¹ Because much of the hard work in the early implementation stages was on the technical and technical services side (especially for libraries bringing up systems which had not been previously field tested), it was perhaps natural that reference librarians and other public services personnel were not counted among those most responsible for bringing forward the technology in libraries. Now more than midway through a decade of tremendous change in libraries, however, it is clear that the public service aspects of online catalog implementation are of considerable interest to the field and that reference librarians everywhere are seeking to forge new roles for themselves.

As public services librarians have sought to define their relationship to the online catalog, it has been natural for them to view the relationship in terms of their role vis-à-vis the older card file technology that online technology supplants. The historic relationship cast the public services librarian as “interpreter” of the catalog—i.e., assisting users to locate items and teaching them how to use the card catalog by themselves. It has long been unclear how much such “interpretation” the card catalog required, though it was long recognized that consistent

¹ Brian Nielsen is Head, Reference Department and Coordinator of Research, Northwestern University Library, Evanston, Illinois; and Betsy Baker is Bibliographic Instruction Services Librarian, Northwestern University Library, Evanston, Illinois.
and clear management of the catalog on the technical services side relieved the burden considerably on the reference side in this regard. With the bibliographic instruction movement having gained considerable force and influence on the field within the past fifteen years, the concept of catalog "interpretation" has come to be understood as mandating instruction, at least in academic libraries.

Do online catalogs require instruction in their use and, if so, how is that instruction best delivered? These questions do not have simple answers, yet from the early online catalog implementations at the beginning of the decade library managers have taken positions that assumed a rather simple "yes" or "no" to the first question.

To approach answers to the two questions of whether the online catalog requires instruction and what might be the best means of delivering it, Northwestern University Library undertook a research study, supported by the Council on Library Resources (CLR), to test the value of online catalog user education. In the pages that follow, the research undertaken at Northwestern will be summarized as to the research objectives, the rationale for the study, a description of the methodology and findings, and the study's major conclusions. Though the research brings new findings to the specific question of how best to provide users with services that will enable them to make best use of an online catalog, our work also addresses some larger questions:

1. What is the role of the reference librarian vis-à-vis a catalog that is now considered to be self-interpreting?
2. What do our experiences with online catalog user education lead us to expect in the way of changes in our bibliographic instruction programs overall?
3. What is the future of reference services in an increasingly automated library?

It is hoped that these issues can continue to be seriously addressed as more and more libraries move from an initial "presentation" phase to an ongoing operational phase in online catalog implementation.

The article begins with an overview of the primary objectives of the "Educating the Online Catalog User" project. These objectives are described in the context of Northwestern's setting, with a brief description of LUIS (Library User Information Service), the online catalog component of NOTIS (Northwestern Online Total Integrated System). Following this is a discussion of some of the underlying issues that prompted our interest in online catalog user education. The issues that surfaced in establishing broad learning objectives—the framework upon which the model program was based—are described, and a de-
Educating the Online Catalog User

scription of the NOTIS transaction log facility—an important data gathering tool in the research—is provided. Finally, the article closes by proposing that reference librarians and managers expand the scope of their online catalog user education efforts to include more than the teaching of a single tool. They should take advantage of the brief historical opportunity presented by the online catalog to use the novelty it provides as a vehicle for teaching users about other information retrieval systems that are becoming increasingly visible both within and beyond the library environment.

The overall purpose of the "Educating the Online Catalog User" study was to provide a model for the development and evaluation of an online public access catalog user education program that could be employed by other academic libraries with any number of different online catalogs. The model was developed by collaborative effort among the reference staff at Northwestern and librarians at the University of Wisconsin—Madison and Washington University in St. Louis. Though the project was centered at Northwestern, public services staff at these other institutions provided advice and feedback at several stages of the project in order to keep the research as broadly focused as possible. The experimental stage of the study was conducted exclusively at Northwestern University.

The study had four objectives: (1) to develop a set of systematic and formalized instructional objectives for teaching online catalog use that could be adopted by other academic libraries seeking to develop an online catalog instruction program; (2) to implement an instructional program based on those learning objectives at Northwestern University; (3) to evaluate the success of this program through a variety of established evaluative techniques including the use of transaction log data; and (4) to assess the viability of transaction log monitoring as a data source for bibliographic instruction evaluation.

It was recognized at the outset that the study's objectives were constrained by the features of the online catalog to which the researchers had the most complete access. Northwestern University Library uses the LUIS online catalog, which has a number of features common to many other such systems but also lacks certain features that present significant instructional challenges. LUIS offers title, author, and subject searching but at the time of the study did not provide keyword searching or the ability to use Boolean operators. A number of descriptions of LUIS exist in the published literature on online catalogs, and LUIS is now available (under various names) in over sixty libraries—academic, public, school, and special—in the United States and Canada.
Online Catalog User Education Issues

The central question that directed this study, "What might be the components of a model program to instruct users of an online catalog?" challenges a commonly held view within the field of librarianship and information science. This view is that an effective "user friendly" interactive computer system—such as an online catalog—should not require instruction at all. While such a view is not universally held, it is common especially among system developers and others who are steeped in the use of computers in libraries and elsewhere. A frequently articulated design specification for end user oriented systems is that all system use instruction should be provided as part of its interface—through such things as introductory help screens, user prompts, and labeling conventions—and should be all that even the most naive user needs to know to be able to effectively use that system. A corollary of this view is that efforts to develop an instructional program for the online catalog suggest that the catalog is not fulfilling its purpose and that its design is flawed. With this logic, any effort to provide instruction in online catalog use by public services staffs might be viewed as wasted effort at the least, and provide implicit criticism of the designers as well.

Though the project from its inception questioned this view of the incompatibility of "user friendly" online systems and instruction programs, it did not simply embrace the contrary view that formalized instruction must be given to all online catalog users. Interactive systems for the general public are simply too new and untested for us to assume either of these positions without a period of considerable experimentation and practical examination of what works and what doesn't work for our users. A certain amount of curiosity, fascination, or mystique naturally accompanies technological evolution. At this early stage of online catalog implementation, learning from the practical experiences of others, as well as from more formal research findings, is essential if we are to move beyond these phases in our program development.

Baker and Nielsen review much of the early literature on the debate about the value of online catalog user education, pointing out particularly the sampling bias in the widely cited CLR Online Public Access Catalog (OPAC) studies, a bias which caused users who experienced difficulties in using online catalogs to be underrepresented in the findings. We became interested in creating a model program for educating online catalog users for a variety of reasons:

1. There was (and is) wide recognition that the perfect online catalog simply does not (yet) exist.
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2. There was (and is) a perception by many librarians that the online user interface may not accommodate all user needs at present and may never do so.

3. "User friendly" systems are not indeed friendly to all, judging from the experiences of many reference librarians who have worked with users trying to master such systems.

4. The pace of change in interface improvements can seem painfully slow once any online catalog system "works" in the sense that it meets managerial (not necessarily user) criteria for "satisficing."

5. A general training program that conveyed information retrieval concepts might aid users as they moved on to other automated systems both within and beyond the library setting.

6. The numerous online catalog instructional programs that had been initiated in various settings—particularly in academic libraries—suggested that making an effort for consistency in instructional planning was worthwhile and beneficial.

Learning Objectives

In order for a model online catalog user education program to be applicable to a variety of institutions and for the program to be formally evaluated, it was critical to the Northwestern project that program learning objectives be stated and generalized beyond those associated with a particular system. The first step in the execution of this research project involved formalizing a set of such objectives which would serve as the basis for teaching the use of an online catalog. Much of the conceptual work related to this aspect of the project is described by Baker.  

In planning the framework of instructional objectives, there was extensive discussion with librarians at each of the participating libraries. These discussions centered on identifying a set of ideal objectives (or goals of instruction) without linking them to features of specific systems or tying them to specific methods of instruction. With the goal of developing a generic instruction program with generalizable objectives, it was essential to look at online catalog instruction as it could be applied across many systems. By focusing on such general expectations of online catalog users, we felt that skills might be more easily transferred across systems.
What to Teach: Concepts or Procedures

In determining an appropriate direction for our online catalog teaching, two concerns were raised. The first involved what technical aspects of the system’s structure should be presented to users; the second questioned the manner in which such aspects should be included in the learning activity. With one of our project objectives being to work toward developing transferability of skills learned about one automated system to skills needed for another, an emphasis on teaching concepts and structure, rather than procedures, was endorsed. In addition to increasing the likelihood for transferability of skills, teaching system structure is useful for conceptualizing the workings of a system. When the way a system works is not transparent to the user, there is little opportunity for self-diagnosis of errors or decision-making for search strategy development.

This instructional approach has been supported by other research in the ways humans interact with computers. Works by Christine Borgman, Ramsey and Grimes, and others discuss the importance of conceptual models in teaching interactive systems and the resulting mental model the user has available for error diagnosis and problem solving. Such conceptual models are often built around metaphors and often illustrate techniques designed to communicate an overall context for system behavior to the learner.

Learning occurs whether it is structured in a systematic program or whether it is coincidental. Coincidental learning of a system through the use of prompts and help screens may actually prove to be an effective means for learning procedures. Focusing an instructional program around conceptual models does not by any means diminish the necessity for a user to have a functional understanding geared toward learning system-specific searching techniques. These techniques may actually be more easily acquired from instruction embedded in the system once the conceptual model has been learned. One of the most important functions of the user interface for online catalogs has been to provide this task-oriented training. With so many automated systems being used in libraries around the country, transferring skills learned about one system to another may prove quite difficult. Designing instruction around a conceptual vs. procedural framework may provide ultimate transferability of learning in the use of online catalogs.

Evaluating the Model

Because the objectives developed for online catalog instruction involved acquisition of both cognitive and behavioral learning, it was
important to develop an evaluation strategy that addressed objective achievement of a group of representative users at solving both cognitive and behavioral problems. Both pencil-and-paper responses and observation of "hands-on" online catalog activity were deemed critical to assess the project.

Another issue important to the study was that of cumulative learning. Because the library patron often learns the use of research tools in stages (such as by trial use followed by assistance from a librarian), cumulative learning, or learning that builds on previous learning, frequently occurs. In the case of learning to use a library catalog, cumulative learning is especially salient: many users are exposed to repeated instruction in the use of the catalog in elementary school; many users rely on experience as the most available (if not most efficient) teacher of library use skills. Bibliographic instruction librarians are aware of the problems inherent in this situation, for they often must help students "unlearn" previously incorrect information concerning the card catalog.

This concern with the effects of cumulative learning led to the development of an experimental design which allowed us to examine and evaluate the effects of two types of bibliographic instruction methods—both individually and combined—taking into account the order of their presentation. The research design protocol called for the creation of two experimental groups (each of which took two tests and participated in two instructional sessions) as well as the use of a control group which only took two tests but received no instruction. The instructional treatments included a classroom-like presentation on the online catalog (what Northwestern has dubbed a "LUIS Workshop"), and the reading of a printed brochure designed to convey instructional content. As the tests themselves required participants to use the online catalog to answer some of the questions, all three groups were exposed to the catalog and its introductory (tutorial) and "help" screens. The two tests were composed of questions designed to test the same knowledge. The control group took the first test followed by a "placebo" presentation (a short noninstructional film) and then the second test. The first experimental group, which we will call Group "A," received the classroom instructional session followed by the first test and then read the instructional brochure and took the second test. The second experimental group, which we will call Group "B," read the brochure and took the first test and then received the instructional session and the second test. Figure 1 provides a graphic representation of this study design. There were thirty subjects in each group.
Sample Selection

A random sample subject population of ninety freshmen students was selected for participation in the study using a sampling technique that insured equal representation by sex and representation by academic
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major corresponding as much as possible to national norms derived from American Council on Education data. Only freshmen who had previously participated in LUIS workshops were excluded from participation. As an incentive for the subjects to commit to participation when they were contacted by telephone, each student was offered a free ticket to a commercial movie theater upon completion of the experiment.

Data Collection

The principal means of data collection for the study were a battery of two written tests prepared for the study and transaction data collected by the NOTIS computer as subjects interacted directly with LUIS. The first test consisted of fourteen questions related to background characteristics of the students, forty-five questions tapping knowledge of LUIS—including some which required use of the terminal—and eight attitudinal questions asking how the students liked various features of the catalog. Eight catalog search “practice questions” for which students had to use the terminals were also included. The second test included the same type of questions as the first except for the fourteen initial questions tapping demographic variables. Pretesting of the two tests with twenty randomly selected Northwestern students verified that the tests, though different, were measuring acquisition of the same learning.

Monitoring online catalog transactions as a means of collecting data was accomplished through utilization of NOTIS software developed initially in connection with the CLR-sponsored OPAC studies of 1980-82 in which Northwestern was a Research Libraries Group participant. The room in which the experiment was conducted was equipped with sixteen online catalog terminals, each having adjacent to it a copy of the Library of Congress Subject Headings. Subjects were instructed to write on their test booklets the identification number of the terminal at which they were searching for the test but were not told that their transactions were being recorded. This protocol device provided a means of unobtrusive measurement of online catalog use in which transaction data could be associated with user characteristics recorded on the test booklets. This strategy is especially notable as a monitoring technique as it allows exemption from institutional and federal guidelines for research on human subjects—due to the educational testing nature of the experiment—and yet is less obtrusive than other monitoring experimental designs in that subjects are led to assume that pencil-and-paper is the sole method of data collection.
Analysis

Following the completion of the data gathering, the 178 filled-out tests were first paired by student identification number and subsequently coded for machine processing. Eighty-seven usable pairs of tests were so coded and input for processing using the Statistical Package for the Social Sciences (SPSS). Tabulated responses were scored using a key of correct test items, and raw percentage correct scores were computed. Analysis was also accomplished in regard to a number of study questions by grouping the raw percentage scores into “high,” “middle,” and “low” performance groups. This grouping enabled as well the analysis of student performance considered in terms of degree of achievement of five important learning objectives established in conjunction with the model program developed at Northwestern. A fuller description of the methods used to reduce the data, as well as detailed findings on the effect of demographic variables on performance, are provided in the authors' final report to the Council on Library Resources on the project.

An indicator of overall test performance for each of the three test groups is the average (mean) test score, again expressed as a percentage of questions answered correctly. Table 1 provides a clear picture of group performance by showing the score for each group on both test one and test two. On both tests the performance of the control group was the lowest. Group “A,” which received the lecture instruction prior to test one, performed best on test one overall, and their score on test two surprisingly dropped. Group “B,” which read the brochure prior to test one, performed less well on the first test, but, following their receiving the live instruction, performed nearly as well on test two as group two had on test one. Analysis of variance tests with the test one and test two data for the mean score by group revealed that the within-group variation on both scores was less than the variation between groups indicating that the different means for each group are statistically significant (p < .001).

TABLE 1
AVERAGE TEST SCORE BY GROUP

<table>
<thead>
<tr>
<th></th>
<th>Test 1</th>
<th>Test 2</th>
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</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>54.66</td>
<td>53.21</td>
</tr>
<tr>
<td>Group “A”</td>
<td>77.5</td>
<td>63.3</td>
</tr>
<tr>
<td>Group “B”</td>
<td>61.66</td>
<td>76.94</td>
</tr>
</tbody>
</table>

ANOVA Significance < .001
These average scores represent overall test performance in only a
general way and are presented in this manner as a way to look at the
cumulative learning issue that was of interest in the study. Because of
the length of the instruction period and the opportunity subjects were
given to interact with the instructor, the superior performance of group
"A" on test one was expected. Why the "A" group's performance
dropped on the second test—following their exposure to the brochure—
cannot be adequately explained by the analysis presented here, but we
may hypothesize that test fatigue may have been an important factor.
Recalling that the "A" group's taking of the second test was nearly
ninety minutes into the period set aside for the experiment, and that the
intervening period between tests for this group was much shorter than
for group "B," it seems highly likely that group "A" was simply tired of
responding to questions on the second test. Group "B," while spending
as long on the experiment overall as the "A" group, did have a consider-
ably longer intervening period between the two tests.

In the matter of evaluating the achievement of specific learning
objectives we were less successful. Although we established a means to
analyze the result of the evaluative test in a way that treated the achieve-
ment of each objective separately, we must acknowledge that a concep-
tual dilemma exists. As certain objectives dealt more concretely with the
learning of definitions and concepts that were easily tested for, while
other objectives—concerned as they were with the execution of
procedures—were inherently more difficult to test for, we cannot make
clear conclusions regarding different levels of attainment on the test.
Different attainment levels may reflect more about the tests themselves
than about actual superior performance in online catalog searching.
Because our knowledge of online catalog users is still so incomplete,
instructional evaluation is made difficult especially in respect to valida-
tion of the appropriateness of certain cognitive learning tasks for suc-
cessful performance in searching. There is some danger in evaluation
studies of this sort to direct instruction to successful completion of the
test rather than to the achievement of skills that the test has been
designed to measure.

With these considerations in mind, an analysis of the data showed
that the group that had the workshop first scored significantly higher
on procedures such as using equipment than the group that had the
brochure. One of the most interesting facts is that the control group
scored higher than both of these test groups on procedural knowledge.
But in interpreting and structuring searches the workshop group did
significantly better. It was followed by the brochure group and then the
control group. In terms of concepts, the control group fell far behind the other two test groups with the workshop group in the lead.

Among our findings on the analysis of the transaction logging was that subjects who had a workshop presentation made fewer errors than those whose first instructional exposure was to the printed brochure.

What do these findings allow us to say about the cumulative effects of two learning experiences with online catalog instruction? Because there is no clear pattern in improvement on all the objectives for any of the three groups it is difficult to say. The order of presentation of the two learning experiences—the brochure and the lecture—did not appear to affect group performance on all five learning objectives in the same way; for some objectives a score increase between test one and test two might have been the result of the lecture having been given first, for other objectives it might have been the brochure being presented first. Further work is in order to refine the analysis and sort out what factors may lead to improved test scores.

Conclusion

Through a close examination of the process of developing learning objectives, creating a program to help meet them, and evaluating the outcome of the program, there are a number of conclusions that we can make. This research has provided some answers to the question which initially motivated the study, "Why teach use of an online catalog?" First of all, it is evident that teaching improves user performance on a written test. The development and use of learning objectives has further helped to define specific competencies which may lead to better online catalog searching. We have further helped define for the field at large those specific competencies that lead to better performance.

Another aspect of our response to the "Why teach the online catalog?" question must be that there are certain concerns that arise with teaching online catalog use at this time. Of primary concern is the necessity to train users on some procedural matters on a case-by-case basis leading to possible difficulties in users' assimilating the information. For example, in any online system there will be details and peculiarities about the library's organization and physical layout which may appear in index displays online. Providing instruction at this level of detail distracts from the overall flow of the presentation and adds only incidental information (in most cases, unless the online system is poorly designed in the first place) which the audience is not likely to remember. Perhaps a greater problem that we are confronted with is the fact that such an explanation reveals idiosyncrasy and inconsistency in the sys-
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tem possibly leading to loss of confidence among users that there is an understandable logic to the system that can be mastered. Such a situation tends to defeat the overall instructional goal.

Inconsistencies are numerous in online catalogs. Explanations for these features through printed guides, lectures, online help, or individual assistance may help ease the burden for many users. However, the explanation to a user of one odd feature in one catalog does not prepare him or her for the next feature or the next catalog. As important as making design improvements in online catalogs is at this time it must be recognized that each online catalog will likely continue to present its own set of instructional problems with which public services librarians must somehow struggle.

There were limitations imposed by the study process itself that point to areas of difficulty in the way library public services staffs perceive the challenge of online catalog user education and thus approach program planning. Our experience and training as librarians has led us to view the online catalog and its use in isolation from other information retrieval developments both within and beyond the scope of libraries.\(^1\) Focusing only on online catalog training may result in narrow program planning. In this research project, we developed a model program which demonstrated positive results in subjects' performance on tests of online catalog knowledge. However, there are clear indications that instructional development which embodies objectives for generalized information retrieval may be a more appropriate teaching ideal.

As a new and very important tool, the online catalog is the focus of a great deal of attention from public services staffs, but this concentration of attention should not necessarily lead to building programs around the teaching of a single tool alone. Users are, on the whole, pleased with the online catalog, but for them it is but one tool among many and, more to the point, a means to an end rather than an end in itself.

Our focus in the “Educating the Online Catalog User” project was to develop a model program for online catalog instruction. In seeking a cognitive model or metaphor upon which to base instruction, we used the card catalog because a number of valuable analogies and comparisons could be made. But as we librarians move further in our own thinking about the direction in which online systems are developing, the card catalog analogies may become less and less appropriate or relevant. The advances in computer communications make the acquisition of knowledge about information retrieval, broadly conceived, increasingly valuable for any library user. Many libraries provide public OCLC terminals in addition to an online catalog of local holdings
already in place or planned. Online searching of commercially vended bibliographic files is gradually working its way from behind the reference desk out into the room. As an outcome of the Linked System Project, one may soon expect to provide the searching of remote files directly within the online catalog interface now provided users. As these systems are introduced, we need to be aware of the more complex training needs such systems may require; building upon our online catalog training experience may be a useful way to prepare ourselves, our staffs, and our users. But to do this, our conceptualization of what is most usefully conveyed about the online catalog must be generalized beyond our traditional notions of catalog teaching. The online catalog toward which the teaching would be directed would serve as an example of a particular implementation of general principles but not the only possible implementation. Bringing in another example—such as a general database management system now commonly available even on the microcomputer—would enrich the instruction. Such a training approach would be more challenging to students and have the great advantage of providing information that would be useful in other contexts.

This approach relegates to a secondary status many of the pieces of helpful information that may make a particular online catalog easier to use, but we feel a broader view may gain both better acceptance by patrons in general and better transferability to other systems. Overcoming the sense of insecurity that this situation may bring will perhaps be difficult at first, but as risks are taken, the rewards may reinforce the new approach suggested here.

References


4. Several publications summarizing the findings of these studies are available, among the latest of which is Matthews, Joseph R., ed. *The Impact of Online Catalogs.* New York: Neal-Schuman, 1986.


8. Lubans, John. "Report to the CLR on a Fellowship Awarded for 1971-72" (unpublished) 28 Nov. 1972, offers a rationale for securing participation in library surveys through offering material rewards. The ability to tap responses from library nonusers, which Lubans's method argues, was deemed important for this study's purposes.


The Invisible Users of Online Catalogs: A Public Services Perspective

SALLY WAYMAN KALIN

The 1982 study on online catalogs sponsored by the Council on Library Resources verified that some users are not happy with the way libraries define their boundaries. Patrons are demanding remote access to online catalogs from their dormitories, homes, offices—even supermarkets and telephone booths—and any other location where they can expend as little energy as possible: "I could use the computer anywhere in town, and it could deliver a book to my home."¹

The popularity of remote access is not new. In the early days of American academic librarianship, the book catalog was popular and college students could use it in their residences to discover what materials their libraries owned. When the card catalog was introduced in the late nineteenth century, one of the major complaints was the loss of this "remote access" ability. A student at Harvard College complained that now he would have to hitch up the horses to his carriage and drive the muddy roads to Cambridge to consult the card catalog—wasting perhaps an entire day.²

Libraries seem to have come full circle working rapidly toward the "library without walls" concept. For those of us in public services work this means offering our services in a decentralized environment. Traditionally we learned about our patrons through one to one contact over the reference desk or through interaction in a classroom. Now we can no longer rely on this library-centered feedback for our perceptions of patrons' needs. This is particularly true when dealing with those who

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remotely access our online catalogs. This group of remote users, whom I will call the *invisible users*, is increasing as more libraries implement dial-access to their catalogs and investigate the viability of networks.

The Pennsylvania State University Libraries have offered remote access to its integrated online catalog, called LIAS (Library Information Access System), for nearly three years. Patrons can reach LIAS either via dial access or through terminals hard wired to the university's Computer Center network. They can call the main campus at University Park (814-865-LIAS) or any of Penn State's other nineteen campuses (which is a local call for most Pennsylvanians). There are a total of thirty-seven lines: sixteen at University Park, three at the Capital College campus, and one at each of the other eighteen campuses. Remote patrons can access the online catalog, corresponding circulation information, plus the MARC monographic tapes which have been loaded into LIAS.

Remote access is used for many purposes. Obviously patrons like the convenience of finding out what materials the libraries own and their availability without leaving their homes and offices. LIAS is very popular with faculty: we often see graduate assistants coming into the library with printouts that have been generated in faculty offices. These graduate students have been sent to the library to fetch and deliver materials for the faculty member. (We suspect that some faculty members like LIAS because they can avoid publicly displaying their ignorance of the system by playing with it in the privacy of their offices.)

Because of the size of the database and the availability of the MARC tapes, LIAS is useful for bibliographic verification. Some special librarians use LIAS to catalog their collections. Consultants use it to discover if the university owns materials they need in their jobs. Secondary school librarians use LIAS to introduce high school students to the mechanics of online searching. As part of Penn State's responsibilities as a regional resource library, it established an 800 toll-free number to allow free access to LIAS by Pennsylvania's District Library Centers. The district centers find LIAS very helpful in preparing interlibrary loan requests. Some patrons try to use remote access for unrealistic purposes: one user was puzzled as to why she couldn't find the address of the attorney general in our database!

The remote access capability of LIAS has been tremendously popular—we probably receive more favorable comments on this than on the online catalog in general—and it serves as an excellent public relations tool. On a personal note, I find that being able to dial LIAS from my home to be a great convenience because it enables me to be more efficient (and comfortable!) when completing professional work.
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Because of the responsibilities as LIAS coordinator, the author has the dubious distinction of being the major contact person in the university libraries for remote access users. Over the past two and a half years, this author has spoken to hundreds of these invisible users, and many perceptions about them and their needs are based on these discussions.

Librarians, faced with implementing remote access to their catalogs, may ask the rhetorical question: as public service librarians, what is our responsibility to these invisible users? Does our responsibility end at the library's walls, or must we take it beyond these walls?

It was discovered that it doesn't matter how librarians think this question should be answered: regardless of the answer, invisible users are demanding service from us. Just as subscribers to commercial databases such as BRS and DIALOG expect assistance—whether it is online or by telephone or via documentation—so do invisible users. Information professionals have always maintained a high level of commitment to their patrons, and experience shows that the invisible user expects no less.

What Kinds of Help Invisible Users Seek

Technical Assistance

Remote access of any kind requires dual skills: (1) how to manipulate a computer terminal/microcomputer, and (2) how to search a structured database such as an online catalog. Surprisingly, an overwhelming majority of requests for assistance involve the former—users do not know how to successfully handle their equipment. As contact person for the invisible users, questions received include "What do I do with the superserial card for my Apple?" or "Will I blow up your computer if I try to use 9600 baud?" or "How do I change the baud setting on my terminal?" The most common query is: "I'm getting garbage. What do I do?" This author has quickly learned that garbage covers a wide gamut of screen displays, and that this is a difficult problem to diagnose.

Sometimes users decide to purchase microcomputer systems just for the purpose of using LIAS, and they call and ask for recommendations of what to buy. Although LIAS can be accessed with any standard microcomputer and modem, it is felt that it is inappropriate for librarians to make any such purchase recommendations.

Invisible users fall into three categories, each with specific needs: Category One: This category includes the person who loves his micro-
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computer and knows how to use it. Often he can be the ideal client, because he will not ask many technical questions as other patrons. However, he may demand more documentation than you had thought necessary; he will probably want to know how the system was constructed; he may ask for codes, etc. that your systems staff regard as proprietary; and he may be harsh in his criticism. Often invisible users in this category come from scientific or technical backgrounds. In general, these patrons can be demanding but may also become your staunchest supporters.

Category Two: A user in this category has access to a machine and is looking for new applications. Most online catalogs, such as LIAS, do not charge any fee beyond communication costs. Users view the online catalog as presenting the ideal opportunity to try out the communications package that came with their microcomputer. They often need assistance establishing the communication parameters on their software. The most important thing to these users is access to the database as the contents of the database are secondary to the fun of access. Often these users are first time users, and they may never try the online catalog again.

Category Three: The third kind of user is frightened or untutored in the workings of his terminal or microcomputer. He may not want to read the accompanying documentation, and even if he reads it he may not understand it. The vendor who sold him his equipment may not be helpful.

These patrons are very difficult to help, and, unfortunately, they comprise a large proportion of invisible users. To be able to provide assistance on all types of microcomputers, communication packages, and modems currently in use is unrealistic. We conducted a survey of remote access users earlier this year; the sixty respondents owned twenty-three different types of micros/terminals, thirty-three different communication packages, and twenty-eight different modems! Possessing this sort of technical knowledge is outside the domain of most librarians; however patrons are surprised to find that we do not have expertise in all kinds of hardware and software.

This category of invisible users often requires a new method of reference work—that of "reference psychotherapist." This includes reviewing the remote access directions step by step, reassuring the patron that everything will be all right, and concluding by guaranteeing that further help is available with the simple statement "call me if you have any more problems" (very few users ever do).
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Searching Assistance

Once users have mastered the basics of their equipment, then they need the skill or the ability to search the online catalog successfully. This is where we had another surprise: several weeks (and over 200 phone calls) passed after implementation of remote access before anyone asked a question about LIAS. However we have had to be cautious about not becoming too complacent about instruction—the lack of questions may not be indicative of successful use of the system.

A large number of remote access users are engineers and scientists who may have more success using an online catalog because: (1) they have the most access to microcomputer systems and software and are therefore most comfortable with them, (2) they have a better conceptual understanding of databases, and (3) they are most accustomed to the procedural mode of thinking, which is valuable when doing online searches. According to the informational requests we get, there are now more students, social scientists, and humanities professors joining the ranks of invisible users. Since they may lack in-depth understanding of computerized systems, they may experience more difficulties using online catalogs in a remote mode.

Some of our invisible users are teaching themselves LIAS by developing their own instructional materials which sometimes wind their way back to us (with errors). There also appears to be a reliance on individuals learning how to use LIAS through their colleagues. Research studies have found that end users of database systems often teach their colleagues to search, and there is no reason to expect that end users of online catalogs are any different. This has given us some concern since a questionnaire survey of 1200 LIAS users found that users taught by friends or peers registered a higher level of dissatisfaction and a lower rate of relevant retrieval than users in general. Are users relying on each other for instruction because our instructional materials are deficient? Or is it because they don't know how to or don't want to obtain assistance?

Currently a popular topic in the library profession is end-user searching of databases such as BRS/AFTERDARK and DIALOG's KNOWLEDGE INDEX. Some of the research that is being published, as well as my own experience at Penn State, indicates that end users often need consultations with librarians and supplementary documentation before they can successfully search these databases. And these databases are designed specifically for the invisible user! Is the searching of online catalogs by remote users really any different than other types of...
end-user searching? Patrons using online catalogs with keyword and Boolean search features are probably struggling with the problems of recall and relevance just as they would be in searching a commercial database, yet little attention has been paid to their needs and problems.

Suggested for Improving Service to Invisible Users

Promote Remote Access Capabilities

Remote access capabilities should be promoted in every way possible, keeping in mind that some remote users are not library users and therefore cannot be reached in the traditional library setting. When remote access to LIAS first became available, we had a press conference for the local media and ran a half page ad in the university's newspaper. Our chief form of promotion is a one page, two-side Remote Access Guide which is made widely available in the libraries and at the student union buildings on campus (although half the invisible users in our survey indicated they had never seen it). Recently we put the text of the Remote Access Guide online with a message on the LIAS banner screen advertising its availability.

In retrospect, we should have told computer retailers in our region of our remote access plans. When dial access to LIAS was first implemented, local dealers received many questions about LIAS and the best method to access it. Some of these questions were attributable to this author because, as LIAS contact, I was recommending that remote users contact their computer dealers for technical questions. If I had informed the dealers of our plans they may have been more receptive to these questions.

Specify Where Assistance is Available

On educational and promotional material, specify a service desk or phone number (hotline) that invisible users can contact in case they need assistance. When LIAS was first available through remote access, we experienced a "testing out" period. Over 200 phone calls were logged the first two weeks, and we should have had extra telephone help. If relying on a phone number, make sure that there is someone available at all times to answer the telephone and, if necessary, take messages. Invisible users who call usually have an immediate need—make sure phone calls are returned promptly. Do not automatically assume that your system's staff will handle these phone calls unless they are especially accommodating and do not mind phone interruptions (something public services librarians are accustomed to!). However, verify
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that the systems staff will be a resource for difficult questions. From transaction log analysis, it was found that heavy use of remote access parallels heavy use of the libraries; this means that remote access queries are frequently received when public services staffs are at their busiest.

Good Documentation

Good documentation is essential whether printed or online. Invisible users seem to rely heavily on online help, and system designers should make sure that this documentation is appropriate. For example, our online documentation told users to press certain function keys to obtain LIAS commands. These function keys are prominently visible on the LIAS terminals located in the university libraries. We had to rewrite our documentation and customize it for invisible users after we realized that these users, who use personal equipment, do not have function keys.

Provide Technical Details

Provide invisible users with details about the technical elements of accessing LIAS. Do not assume that they are knowledgeable about using their equipment. They need to know about terminal emulations, adjusting screens, communication parameters, logging on, and disconnecting. Be cautious in developing this documentation; take care not to overwhelm them with so much detail that they cannot interpret the directions. If they get frustrated setting up their hardware and software they may never become regular users. Remember that first time use of a new system is never completely “user friendly.”

Understandable System Prompts

Make sure your system prompts are understood by users outside the library setting. It may be advisable to have a two-level system of prompts—i.e., one that acts as a tutorial to “hold the user’s hand” and guide him through a search, and the other could be a simple prompting system for the experienced searcher. “Friendly” end-user reference systems can act as models. The invisible users who answered our questionnaire indicated that “muddling through” is a popular response to problems. With better online prompts users can “muddle through” a bit easier.

Is the System Easy to Relearn?

When designing an instructional program for an online catalog remember that maintenance of skills may be difficult for remote access
users, as their use of the system may be more sporadic than regular library users. When calling for assistance, users sometimes mention that they have used LIAS once or twice before but have forgotten key skills. How easy is your system to relearn?

_Messaging Systems_
Investigate messaging systems, such as electronic mail, which would allow you to communicate electronically with your patrons. Then you can answer questions in not only an appropriate but an efficient manner.

_Train Public Services Staff in Remote Access_
Public services staff should be trained in remote access use. To be effective, this training should include hands-on practice in remote access to the online catalog. Our information desk functions as the first contact point for remote access questions, and initially the staff was confused by questions about parity, duplex, and stop bits. Most of the information staff had never done any database searching, and we unfairly imposed upon them by expecting them to answer a barrage of technical questions. In addition, our invisible patrons were frustrated by the lack of adequate assistance. We had to put the staff through a training program that emphasized definitions of computer terms.

_Conduct Research About Users_
If at all possible, conduct research to find out something about your invisible users. We tried to reach our invisible users by sending out a questionnaire with the university’s MUG (Microcomputer User Group) Newsletter which has a circulation of over 800. Unfortunately we had only sixty responses; however we were still able to develop some assumptions about these users and the adequacy of the services that we offer them. In addition, this author has kept a record of the kinds of individuals who have been calling for assistance and the kinds of questions they ask. It was determined that the majority are faculty members, seconded by professionals on campus and in the community. While students were originally a small group, their numbers are growing rapidly as they purchase microcomputers for their apartments and dormitories.

Several years ago the University of Illinois Libraries conducted a study entitled _The Invisible User: User Needs Assessment for Library Public Services_, which was sponsored by the General Electric Foundation and published by the Association of Research Libraries. Its purpose
Invisible Users of Online Catalogs

was to analyze and compare the information needs—particularly in the electronic arena—of faculty in various subject disciplines. The results revealed that those using computer-based systems are bypassing the library as an intermediary. To collect data from their invisible users, the Illinois librarians designed an online questionnaire that could be completed by users after dialing into their online catalog. This report is recommended for those considering the implementation of remote access to their invisible constituency. It offers some valuable suggestions for collecting concrete data on the needs of invisible users.5

Conclusion

When librarians are queried as to whether they will have dial access to their online catalog, the answer is usually “yes,” as if this is an obvious and logical extension of a functioning catalog. Yet discussion on how to serve the invisible users of these catalogs is sadly lacking from the professional literature and librarians’ forums.

Librarians and administrators must remember these invisible users as they design and implement integrated online catalogs. They must adopt a proactive stance, anticipating these users’ needs and the services that will satisfy them. Our experiences at Pennsylvania State have taught us that satisfying this group of users has much to do with the total success and acceptance of the libraries’ online system.

References

A Study of the Impact of Introducing an Online Subject Catalog at the New York State Library

BEN-AMI LIPETZ
PETER J. PAULSON

Introduction

The computerization of catalog services in research libraries is generally regarded as both inevitable and desirable. Many major research and academic libraries have already installed computerized public catalog systems to replace more traditional catalog systems such as card, book, and microform catalogs; in most libraries where such changes have not yet been made, active planning for them is in progress.

The administrative imperatives for computerizing a library's public catalog are usually quite clear—the prospect of providing catalog service with fewer staff members, lower unit costs for cataloging, faster input of new catalog data, faster reorganization or modification when required; the ability, in principle, to interact with broader computer networks and consortia; and the ability to extend catalog access opportunities beyond the physical confines of the library building. A host of online public catalog systems are emerging that, to different degrees and in somewhat different ways, address these very important goals of computerization.

But another important administrative consideration—beyond trying to hold down the costs of catalogs and increase their accessibility—is that of maintaining the quality of the catalog service provided to

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patrons. It is usually assumed as obvious that a new, computerized catalog system will serve the library's users at least as well as the traditional catalog it supplants, and probably better. But not much research has been done as yet to determine the accuracy of such assumptions nor the circumstances under which they may be true or false. Indeed, much of the evaluative research that has been performed on the online catalog systems to date has been, in a sense, marketing research—intended to identify the various product configurations that are available and to determine their acceptance by purchasers and initial users. The measurement and comparisons of actual performance of alternative catalog systems are much more difficult to achieve; such objectives have tended to be secondary at best.

What research has been done to determine the service quality of computerized public catalogs has usually involved questionnaire surveys or interview surveys of catalog users undertaken only after installation of the new systems. Studies of this kind that relate to online subject catalogs in particular have been conducted and also reviewed by Markey. They have established several interesting findings. For example, there is wide agreement that users tend to accept the new online catalogs easily or enthusiastically. There is much evidence that online catalogs are used somewhat differently from traditional catalogs. In particular, the proportion of searches that are subject searches (as opposed to author or title searches) seems to be much higher in general for online catalogs than for traditional catalogs although wide ranges have been observed for both types.

But on the whole there is still very little knowledge available about the qualitative and, especially, the quantitative performance of online catalogs. There is a dearth of information on such vital questions as: whether and how computerization of the catalog system affects the success rate of catalog searches, duration of catalog searches, user tendencies to utilize or avoid the catalog; and how changes in specific features of the catalog system are reflected in the use and users of the system.

Probably the best approach to these unanswered questions is the impact study—i.e., research in which the use of a system or service is investigated before the system is changed as well as after it has been changed, in order to identify as directly as possible whatever impacts the change may produce. The work reported here is believed to be the first impact study of the introduction of online subject searching capability in the public catalog of a large research library.

The opportunity to undertake a potentially significant impact study of computerization of a public catalog presented itself in 1982 at
Impact of an Online Subject Catalog

the New York State Library (NYSL). The NYSL is a major research library and is the largest of the state libraries in the United States. Its rich collections and its many information services serve not only state governmental agencies but also various state and national library networks and individual visitors of all kinds. The NYSL's public catalog is a hybrid system—i.e., it is partially on computer and partially on microfiche. A computerized author/title search system using truncated keys has been available since 1978 when NYSL moved to new quarters in the Cultural Education Center at Albany's Empire State Plaza. The NYSL's 3.2 million card catalog was not moved to the new building and ceased to be the public catalog. In its place a microfiche catalog was provided for public use which can be accessed by subject headings as well as by author and title terms; the microfiche catalog consists of separate microfiche series and supplements for general monographs, government documents, and serials. Numerous online terminals and microfiche viewers are in place for visitors' use throughout the public areas of NYSL.

A lengthy in-house effort to design and develop a computerized subject access system reached its objectives in 1982. The NYSL scheduled installation of the new system for public use in mid-1983. The existing microfiche catalog would be maintained in parallel with the online system at least for some length of time. Thus there was an opportunity for a before-and-after impact study; and there would also be the opportunity to compare uses of two different subject catalog systems that would be available simultaneously to NYSL visitors.

The authors had worked together previously in connection with a series of research investigations of the visitor population at NYSL. It was apparent that the same kind of research method that had been used to study NYSL's general visitor population could be adapted readily for application in a more focused study of NYSL's catalog users. Partial support for this new study was provided by the Council on Library Resources through a grant from its program to assist faculty/librarian cooperative research. Information collection activity extended from January 1983 through May 1984. A project report was submitted in late 1984. Data analysis activity has continued since that time.

Objectives

The aim of this research was to detect and to measure such impact on use and users at NYSL as might result from the addition to the NYSL public catalog of a new online subject searching capability. A number
of particular aspects of catalog use were selected *a priori* to be observed for possible indications of impact and included:

- the amount and distribution of catalog use instances;
- the proportion of catalog searches that are subject searches;
- the duration of catalog searches;
- the success rate of catalog searches;
- the use of librarian assistance with catalog searches by visitors;
- user preferences for online *vs.* microfiche subject catalogs;
- motivation of catalog searches; and
- user status or affiliation.

The research involved collecting relevant information at NYSL during several week-long sampling periods that both preceded and followed the mid-1983 change in the public catalog and then comparing data from the different periods for indications of impact and for indications of the magnitude and permanence of the impacts detected.

**Methodology**

**Research Design**

The research plan is very simple in concept: First, establish a "baseline" profile of catalog use factors by studying catalog use before the system is changed. Next, repeat the same measurements shortly after the new catalog system has been introduced, and repeat them once more several months later. Finally, compare data in the three sets of measurements to determine whether there have been apparent impacts from the catalog change, and also to determine for each impact whether it has persisted or diminished with the passage of time. A discussion of the features of this research plan was presented shortly after the project got underway.

The period of time selected for the baseline study and the two follow-up studies was one week for each. Care was exercised to try to select normal weeks, without holidays and without unusual scheduled events that would be expected to perturb the level or nature of NYSL use by visitors. The NYSL is open from 9 a.m. to 5 p.m. on weekdays only; a week of study thus requires observation only during normal business hours.

The data collection activity was basically the same in each study week. It was a coordinated blend of two research techniques: (1) the counting of total visitor traffic by unobtrusive observation, and (2) the interviewing of a sample of visitors at frequent preset intervals through-
Impact of an Online Subject Catalog

out the test period. This coordinated method was used very successfully in the earlier studies of the NYSL user population. In the previous studies, visitors were counted by an observer as they were leaving NYSL (there is only one portal for visitors), and the interviews were conducted by a second researcher with the visitors who happened to exit immediately after each fifteen-minute interval on the clock. Since staff members often use the same portal as visitors but were not to be counted by the traffic observer, the interviewing served as an important check on the accuracy of the observer's discrimination and provided the basis for adjusting the observer's tally to make it more accurate. Interviewing also provided quantitative data about characteristics of the visitor population and their use of NYSL. The traffic data provided a profile that served as the basis for normalizing the quantitative interview summaries with weighting factors to adjust for mismatches in the relative numbers of visitors and numbers of interviews throughout the day, so that no activities peculiar to any particular time of day would be over- or underemphasized in the results.

In the present study, the same coordinated blend of traffic counting and interviewing was employed; but it was applied this time to two different populations:

1. The NYSL visitor population—exactly the same population addressed in previous NYSL studies. This was considered necessary because the day-to-day or week-to-week volume and composition of visitor traffic may fluctuate a good deal, and one should be able to screen out the effects of such "irrelevant" fluctuations when seeking impacts that are attributable to the change in the catalog system.

2. The users of the NYSL public catalog were the second population studied. This is not the same as the visitor population since not all visitors are catalog users nor is it exactly a subset of the visitor population, since a substantial portion of the public catalog use at NYSL is by members of the NYSL staff. Staff members also have online catalog terminals and microfiche catalogs and viewers for their exclusive use at work stations in nonpublic areas; this use was not studied.

The observation and recording of traffic is a rather simple matter in the case of the visitor population but more difficult for the public catalog user population. For the counting of visitor traffic, an observer was stationed just outside the single exit portal from NYSL's public area; from that point all exiting visitors could be observed. Traffic was registered on two hand-held counters, one for females, one for males. Counter readings were entered on a tally sheet at fifteen-minute inter-
vals. The traffic observer also recorded for every fifteen-minute interval the number of visitor interviews that had been attempted by his or her research teammate, the number of refusals (if any), and the number of staff members mistakenly approached for interviews (if any).

In the case of observing public catalog user traffic, the observer's task was to keep a minute-by-minute record of any occupancy of each public catalog access device—that is, of each of the microfiche viewers and online catalog terminals provided for use by visitors. At NYSL, most of these public access devices are grouped in close proximity in the north wing, and the few remaining devices are grouped in the south wing. To minimize personnel needs for the research, it was decided to observe catalog traffic and use at only the larger of these two groupings. Thus one traffic observer kept track, in the baseline study, of eight microfiche viewers and four online terminals; this configuration was changed to six microfiche viewers and ten online terminals during the follow-up studies. Using a simple form with separate columns for the individual access machines and rows for each minute of the hour, the observer mapped each use session by drawing a vertical trace for each minute the machine was in use and by adding code symbols to indicate if the user was a female visitor, a male visitor, or a staff member, or to indicate whether there was staff-visitor interaction during the use session, and to flag the sessions that resulted in catalog user interviews.

The preset quota of library exit interviews to be attempted was one interview during each fifteen-minute interval before noon, then two per interval until the final half hour of the day, then three in the final two intervals. This schedule was chosen to correspond more or less to the hourly variations in visitor exit traffic that had been clearly established in earlier research at NYSL. On the other hand, the quota of catalog user interviews to be attempted was set at a constant one interview per fifteen-minute interval because there was no previously determined basis for a more complex sampling pattern. For consistency, this simplistic quota was maintained in the follow-up study weeks. The person to be interviewed was thus the first person to leave a catalog access device after the start of a fifteen-minute interval.

Interviews for both populations usually took only one or two minutes to complete. A single-page questionnaire designed to fit into a clipboard was used for recording the results of the interview. The questionnaires—different for the two populations to be interviewed—were designed with the help of comments and suggestions from NYSL staff members. The exit interview questions elicited information about the frequency of the visitor's use of NYSL; about the length, motivation, and success of the visit just ended; about the use or nonuse of the public
catalog during the visit, the wing of the library in which any catalog use occurred; about the use or nonuse of staff assistance; and about the visitor's affiliation or status. The catalog user interview questions were chosen to gain information about previous use of the library and the catalog system; about the motivation of the search just ended and the approach used; about the perceived success of the search; and about the user's affiliation.

Implementation

The new online subject catalog was made available for public use during the late summer of 1983. Two microfiche viewers were removed and six new online terminals were installed in the observed public area. All of the online terminals are of identical manufacture. While all are capable of being switched by knowledgeable NYSL staff members to function as either a subject terminal or an author/title terminal, NYSL chose not to instruct visitors on this switching capability; instead, each online terminal was designated and labeled as either a subject or an author/title terminal. The usual configuration during the follow-up study weeks was five subject terminals and five author/title terminals. The research team kept careful track of the designation of each terminal under observation since there were occasional changes from day to day or within a day.

The NYSL's online catalog system was designed for two levels of search sophistication, but only the menu-driven level 1 was made available through the public catalog online search terminals during the period of this research. At this level, a subject search is performed in a series of steps that are prompted by messages on the screen. The subject search may be the specification of one or more words that are presumed to be in a subject heading (multiple words are automatically AND-combined), or the specification may be the registry number of a desired subject heading. The response to the first is a list of subject headings that match the input terms, with the number of items cataloged under each heading. A list of titles under any of these headings may then be called up. The response to the second type of subject search is the list of titles cataloged under that subject heading. In either case, when there is only a single title in the list, the full record is displayed; otherwise the full bibliographic records may be called up one at a time from the title list. Bound printouts of the full list of NYSL subject headings, in alphabetical order, are kept on a table in the center of the public catalog area for use in identifying valid headings and their associated registry numbers. (It should be added that the NYSL online system has more
recently been upgraded to permit subject searching for words in the titles of cataloged materials, as well as for words in subject headings.)

Printed multipage flip displays containing instructions on the use of NYSL's catalog system are provided on the table close to each access device. Visitors may ask for librarian assistance at an information desk or at any of the three (originally four during the baseline study) work stations for specialized parts of the collection that surround the public catalog area and are manned through much or all of each day.

The baseline study week began on Monday, 18 April 1983. A sudden snowstorm disrupted the region the next day making the Tuesday and Wednesday data unusable. As a result, data were collected for Tuesday and Wednesday of the following week and used instead. The first follow-up study began on November 28th and was uninterrupted. The second follow-up was also uninterrupted—it began on 30 April 1984 which was close to the anniversary of the baseline study. In total, thirty-six people were involved in the data-collection activities at one time or another during this research. Most of these people were master's program students from the School of Information Science and Policy of the State University of New York at Albany. A substantial proportion were already aware of both the objectives and the research methodology from assigned reading and class discussions in some of their school courses. Participants received both written instructions and initial close supervision; there were no problems with performance in data collection. Aside from the snowstorm already mentioned there were no major occurrences that would affect the comparability of the three study weeks. The few minor incidents that occurred were duly noted but were considered negligible and not warranting any special adjustments in data analysis. Such incidents, few and randomly distributed, included episodes of computer slowdown or stoppage and a fire drill that emptied the library for several minutes. During the first follow-up week, there was one afternoon when no data collectors were available to count and interview the exiting library visitors. This was handled in the data analysis by assuming that the afternoon traffic count had remained in the same proportion to the weekly average as had the morning count for the day and by treating the interview results from the other four days as though they represented the entire week.

Analysis

The initial analysis of traffic data and interview data for the visitor population was carried out in the manner described in previous studies of NYSL users. It thus included the adjustment of traffic counts to correct for miscounting of some staff members as visitors, and included
Impact of an Online Subject Catalog

the weighting of interview results in order to reflect the relative amount of library use at the time of interviewing. The adjusted average counts of visits per day during the three study weeks were 344.8, 316.6, and 315.6 respectively. The numbers of exit interviews with visitors completed during the respective study weeks were 264, 218, and 273 (see table 1, no. 1).

In analyzing the data on public catalog use, it was judged unnecessary to weight the interviews on the basis of an hourly traffic pattern. No well-defined pattern of catalog use traffic could be discerned other than sparse traffic at the extremes of the day (when interviews were correspondingly sparse). During the baseline week and the first follow-up week it was noticed that use of the catalog surged immediately after the lunch hour, but this surge was not observed in the second follow-up week. Average daily catalog use instances observed during the three study weeks were 221.6, 201.8, and 162.2. The numbers of interviews with catalog users completed in these weeks were 158, 147, and 150 (see table 1, no. 2).

The mapping technique that was employed for recording minute-by-minute use of each of the public catalog access devices (microfiche viewers and online terminals) was devised in part to permit analysis of queuing problems in the public catalog area. As it turned out, no queuing problems developed. There were enough devices available to accommodate all would-be users and uses during all hours of each study week. Another purpose of the mapping was to permit determination of the lengths of the catalog use sessions. This was accomplished by noting the number of minutes of occupancy in the demarcation of each use session as mapped for each access device observed.

Some results of analysis of data from this research are given in the accompanying tables. These results are discussed later as they relate to specific questions regarding the impact of the online subject catalog on public catalog use.

Impact Questions Investigated

It is not possible in an impact study to investigate all of the consequences of a system change that can be conjectured—the conceivable impacts of a change are infinite. In this study, the many types of data collected will, in theory, allow for the investigation of hundreds, even thousands, of impact possibilities—all of the combinations of data types that may be examined and compared from one study week to the next. But even this subset of possibilities will probably never be examined fully because of the large and unreasonable effort that would be needed.
## TABLE 1
MEASUREMENTS OF LIBRARY AND CATALOG USE, AND SAMPLING LEVELS

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Baseline</th>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Survey Weeks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Library visits and exit interviews</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Library visits during survey week</td>
<td>1724</td>
<td>1583</td>
<td>1578</td>
</tr>
<tr>
<td>b. Average library visits per day</td>
<td>344.8</td>
<td>316.6</td>
<td>315.6</td>
</tr>
<tr>
<td>c. Exit interviews during survey week</td>
<td>264</td>
<td>218</td>
<td>273</td>
</tr>
<tr>
<td>d. Average exit interviews per day</td>
<td>52.8</td>
<td>43.6</td>
<td>54.6</td>
</tr>
<tr>
<td>e. Percentage of library visits in which exit interviews were conducted</td>
<td>15.3%</td>
<td>13.8%</td>
<td>17.3%</td>
</tr>
<tr>
<td>f. Percentage of library visits in which there was use of the catalog</td>
<td>28%</td>
<td>33%</td>
<td>38%</td>
</tr>
<tr>
<td>2. Public catalog uses and interviews</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Public catalog uses observed during survey week</td>
<td>1108</td>
<td>1009</td>
<td>811</td>
</tr>
<tr>
<td>b. Average public catalog uses observed per day</td>
<td>221.6</td>
<td>201.8</td>
<td>162.2</td>
</tr>
<tr>
<td>c. Catalog user interviews during survey week</td>
<td>158</td>
<td>147</td>
<td>150</td>
</tr>
<tr>
<td>d. Average catalog user interviews per day</td>
<td>31.6</td>
<td>29.4</td>
<td>30</td>
</tr>
<tr>
<td>e. Percentage of catalog users interviewed</td>
<td>14.2%</td>
<td>14.6%</td>
<td>18.5%</td>
</tr>
<tr>
<td>3. Visits to library observed areas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. During survey week</td>
<td>1425</td>
<td>1242</td>
<td>1223</td>
</tr>
<tr>
<td>b. Average per day</td>
<td>285</td>
<td>248.4</td>
<td>241.6</td>
</tr>
<tr>
<td>c. Percentage of observed-area visits in which exit interviews were conducted</td>
<td>18.5</td>
<td>17.6</td>
<td>22.3</td>
</tr>
</tbody>
</table>
Impact of an Online Subject Catalog

TABLE 1 (cont.)

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Baseline</th>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey Weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Public catalog uses in observed area during survey week
   a. By visitors                  | 590 (53%)| 627 (62%)| 584 (72%)|
   b. By staff                     | 518 (47%)| 382 (38%)| 227 (28%)|
   c. Total                       | 1108     | 1009    | 811     |

5. Public catalog uses per observed area visit
   a. By visitors                  | 0.414    | 0.505   | 0.478   |
   b. By staff                     | 0.364    | 0.308   | 0.186   |
   c. Total                       | 0.778    | 0.813   | 0.663   |

*Observed area did not include all points of public catalog access.

In order to reduce the data analysis task in this research to reasonable proportions, it was necessary to establish priorities. These took the form of questions that seemed most worth answering regarding possible impacts of the catalog change. Seven high-priority questions were formulated and then answered on the basis of the data collected. Other questions may be addressed in the future. The impact questions that are dealt with here are:

1. After the new online subject searching capability was introduced in the NYSL public catalog did it attract much use?
2. After the introduction of the online subject searching capability, was there a change in the overall volume of use of the public catalog by visitors?
3. Was the introduction of online subject searching capability followed by a change in the proportion of public catalog use instances that are subject searches?
4. Has the availability of online catalog access for subject searches as well as author/title searches resulted in the rejection of the older microfiche catalog by public catalog users?
5. Following introduction of the online subject catalog, was there a marked change in the average amount of time spent per instance of use of the public catalog?
6. Was there a change in the success rate of public catalog searches after introduction of the online subject catalog?
7. After introduction of the online subject catalog was there a change in the extent to which visitors made use of librarian assistance in conducting their catalog searches?

SPRING 1987
Findings

Acceptance of the New Online Subject Catalog

In the sense of attracting use, the impact of the catalog change has been immediate, substantial, and apparently enduring. In the first follow-up study after its introduction, the online subject catalog’s use was 22.9 percent of all instances of public catalog use (see table 2). In the second follow-up study its use had risen to 28.6 percent. In other words, despite the continued availability of the previous catalog alternatives, the online subject catalog attracted and has held about one-fourth of the public catalog traffic.

TABLE 2
USE OF ALTERNATIVE CATALOGS AS PERCENT OF ALL PUBLIC CATALOG USE

<table>
<thead>
<tr>
<th>Survey Weeks</th>
<th>Catalog Used</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>First</td>
</tr>
<tr>
<td>Online catalog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Author/Title access, visitor use</td>
<td>18.1</td>
<td>20.0</td>
</tr>
<tr>
<td>staff use</td>
<td>23.3</td>
<td>21.6</td>
</tr>
<tr>
<td>total use</td>
<td>41.4</td>
<td>41.6</td>
</tr>
<tr>
<td>Subject access, visitor use</td>
<td>-</td>
<td>16.2</td>
</tr>
<tr>
<td>staff use</td>
<td>-</td>
<td>6.7</td>
</tr>
<tr>
<td>total use</td>
<td>-</td>
<td>22.9</td>
</tr>
<tr>
<td>Microfiche catalog, visitor use</td>
<td>35.0</td>
<td>26.0</td>
</tr>
<tr>
<td>staff use</td>
<td>23.6</td>
<td>9.5</td>
</tr>
<tr>
<td>total use</td>
<td>58.6</td>
<td>35.5</td>
</tr>
<tr>
<td>total, subject searches</td>
<td>25.8</td>
<td>16.3</td>
</tr>
<tr>
<td>(44%)</td>
<td>(45%)</td>
<td>(48%)</td>
</tr>
<tr>
<td>total, author/title search</td>
<td>32.8</td>
<td>19.2</td>
</tr>
<tr>
<td>(56%)</td>
<td>(54%)</td>
<td>(52%)</td>
</tr>
</tbody>
</table>

Volume of Use of the Public Catalog

The introduction of online subject searching capability apparently had an impact on the overall volume of use of the public catalog. This impact seems fairly complex. The most obvious, but probably least significant, change was that the number of instances of public catalog use was lower in the first follow-up week than in the baseline week, and lower still in the second follow-up week (see table 1, no. 2). However, this can be accounted for by obvious factors other than the catalog
Impact of an Online Subject Catalog

There was a decline in visitor traffic from one study period to the next that would be expected to cause a corresponding decline in use of the public catalog (see table 1, no. 1). Also there was a decline in the use of the public catalog by members of the library staff that must be adjusted for in order to determine whether there was an impact on visitors' use of the public catalog (see table 1, no. 4).

A preferred measure of the volume of catalog use would be the ratio of instances of use to the number of visits made to the area of the library that was studied. The number of visits to the observed area (see table 1, no. 3) was calculated using both direct measures (exit traffic counts) and indirect measures (information on the library area used as obtained from exit interviews). When the count of visitors' use of the catalog is related to this measure of visitor traffic, it is found that the number of visitors' catalog use instances per visit rose from 0.414 in the baseline week to 0.505 in the first follow-up and then dropped a little to 0.478 in the second follow-up. This suggests that the impact of introduction of the online subject catalog was to produce a substantial and lasting increase in the degree that visitors use the public catalog.

Further analysis reveals that the increased public catalog use by visitors resulted from the involvement of a larger proportion of visitors in catalog use, rather than from more frequent catalog use by the original proportion of users. The percentage of library visits in which there was any catalog use rose from the baseline figure of 28 percent to 33 percent and then to 38 percent (see table 1, no. 1), while the average of the number of catalog uses observed per visit involving any catalog use was practically unchanged from baseline to first follow-up (1.46 and 1.52), and actually dropped (to 1.26) in the second follow-up.

The use of the public catalog by library staff dropped precipitously and increasingly after the introduction of online subject search capability. This drop is clear from the absolute number of staff uses of the public catalog observed in the study weeks (518, 382, and 227 respectively) and also in the ratio of staff searches to library visits (0.364, 0.308, and 0.186 respectively). The reason for this drop has not been established. It may reflect a shift in staff assignments (one of the four manned service stations in the observed wing was closed in mid-project and several staff members were shifted to the other wing); or it may reflect a shift in choice of access points for staff searches, with increased use of staff workstation terminals and viewers instead of the public catalog access devices; or it may reflect a genuine drop in use of the catalog by staff for some unknown reason. The data seem to rule out the further possibility that staff use of the public catalog decreased after the catalog change because visitors were now doing searches for themselves that had for-
merly been done for them by the staff. Measured as the change after the baseline study in instances of use per visit, the increase in the first follow-up of visitor use (0.091) is enough to explain the staff use decrease (0.056), but this explanation fails in the second follow-up (0.064 net increase v. 0.178 net decrease).

Proportion of Subject Searches

Another impact of the introduction of online subject searching capability was to increase the proportion of subject searches performed at the public catalog. In the baseline week, 27 percent of all instances of public catalog use—as determined from interviews with catalog users—were subject searches; in the first follow-up the subject search percentage was 41 percent; in the second follow-up it was 49 percent (see table 3). This affirms or supports previous findings reported and cited by Markey.10

TABLE 3
DISTRIBUTION OF CATALOG USE BETWEEN SUBJECT SEARCHES AND AUTHOR/TITLE SEARCHES

<table>
<thead>
<tr>
<th>Survey Weeks</th>
<th>Public Catalog Users</th>
<th>Baseline</th>
<th>First</th>
<th>Second</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Subj. A/T</td>
<td>Subj. A/T</td>
<td>Subj. A/T</td>
</tr>
<tr>
<td>All public catalog users</td>
<td>27%</td>
<td>73%</td>
<td>41%</td>
<td>59%</td>
</tr>
<tr>
<td>Visitors</td>
<td>31.5%</td>
<td>68.5%</td>
<td>49.5%</td>
<td>50.5%</td>
</tr>
<tr>
<td>Staff</td>
<td>21%</td>
<td>79%</td>
<td>17.5%</td>
<td>82.5%</td>
</tr>
</tbody>
</table>

As in the case of impact on the volume of catalog use, the impact on proportion of subject searching is more complex than the gross figures suggest. These figures do not reflect the increasingly heavy representation of visitors (as opposed to staff) in the use of the public catalog after the catalog change. Looking at public catalog use by visitors only, about one-third of their use instances in the baseline week were subject searches; this increased to one-half in the first follow-up and remained at that new level. For staff the baseline proportion of subject searches at the public catalog was about one-fifth. It remained almost the same (decreased very slightly) in the first follow-up, and then more than doubled to about 45 percent in the second follow-up. These separate analyses for visitors and staff (particularly) should be regarded as only approximate because of the relatively small numbers of interviews on which they are based.
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From figures provided in tables 1 and 3, one can calculate that the average number of subject searches performed per day in the observed area was sixty during the baseline study and then rose to eighty-three and seventy-nine in the two follow-up weeks. Considering that this absolute increase in the number of subject searches occurred despite decreases in the number of library visits and catalog users present, this is perhaps the most dramatic indication of the substantial and lasting impact of the introduction of online subject searching capability on the proportion or frequency of subject searching.

Use of Alternative Catalogs

Introduction of the online subject catalog had the impact of diminishing the use of the older microfiche catalog but not an impact on its displacement as an acceptable public catalog. The percentage of catalog use instances involving the microfiche catalog was 58.6 percent in the baseline week and diminished to 35.5 percent and 34.2 percent in the follow-up weeks (see table 2). This drop in microfiche catalog use was substantial and enduring. It reversed the prechange dominance of microfiche over online (author/title only) use. On the other hand, it is clear that the microfiche catalog was not rejected. It retained one-third of total public catalog use, which is a greater share than the new online subject catalog attracted during the impact study.

The introduction of the new online subject catalog did not affect the proportional division of searches of the microfiche catalog between subject searches and author/title searches. Subject searches accounted for 44 percent of microfiche catalog uses in the baseline study and for 46 percent and 48 percent in the follow-up studies (see table 2). Thus the impact of the catalog change in reducing use of the microfiche catalog was about equal for both types of microfiche catalog searches. A possible explanation for this finding that warrants further exploration is that there had formerly been a substantial number of intended subject searches that users of the microfiche catalog were "sublimating" by searching instead for known works by author/title access, and that such searches now tend to be conducted as proper subject searches on the new online catalog. The tendency of catalog users to sublimate subject searches in a catalog that is inhospitable was established by Lipetz in previous research on use of a large university card catalog.11

It is important to qualify the findings given earlier by noting that there is not 100 percent correspondence between the online and microfiche catalogs at NYSL with respect to scope, information content, and access terms. There can be legitimate reasons for favoring one catalog over the other for particular types of literature interests. During this
research, many NYSL staff members who used the public catalog remarked on differences between the catalogs for special purposes. Some of the visitors who were interviewed after catalog searches also remarked on differences in the catalog, but many of these persons seemed to be misinformed about the relative strong and weak points of the two catalog systems.

Duration of Catalog Use Instances

The data collected on minute-by-minute occupancy of the various catalog access devices were analyzed to determine whether introduction of the online subject catalog had an impact on the amount of time that users require in using the public catalog. No such impact was found. The average duration of an instance of public catalog use—including both the online and microfiche catalogs and all types of searches—remained remarkably constant—i.e., 7.57 minutes in the baseline study, 7.59 minutes in each follow-up (see table 4). The median time for catalog uses changed very little. It increased from 4.46 minutes in the baseline study to 4.74 and 4.68 minutes in the follow-ups. The change in median time resulted because there was a decrease in the relative proportion of extremely short searches and also an even more significant decrease in the relative proportion of extremely long searches. It is noteworthy that most of the long catalog searches are subject searches.

Catalog Search Success and User Satisfaction

Because there was such ready acceptance of the new online subject catalog by library visitors, one might expect this acceptance to be associated with an improved level of service to catalog users. However, the results of interviews with catalog users showed that the change in the catalog brought no improvement in the user-determined success rate for public catalog searches. There was, rather, a small decrease in the success rate—from 74 percent in the baseline study to 72 percent and 69 percent in the two follow-ups (see table 4). Curiously, the percentage of searches judged to be unsuccessful did not increase correspondingly. Rather, there was a substantial increase in that small group of searchers whose success or failure could not be judged immediately after catalog use by the persons who were interviewed.

Similarly, there was no indication that introduction of the online subject catalog had any clear impact on the general satisfaction of visitors with their visits to the library. Data from the exit interviews with visitors (see table 4) showed that the percentage of visits judged to be successful remained about the same (88 percent, 86 percent, 89 percent) even though the proportion of visits in which there was catalog use increased greatly during this period (see table 1) and overall catalog preference shifted from microfiche to online (see table 2).
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TABLE 4
SEARCH DURATION, SEARCH SUCCESS, VISIT SUCCESS, LIBRARIAN ASSISTANCE

<table>
<thead>
<tr>
<th>Factor</th>
<th>Survey Weeks</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of public catalog use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>instance, average</td>
<td>Baseline</td>
<td>First</td>
</tr>
<tr>
<td>median</td>
<td>7.57 min.</td>
<td>7.59 min.</td>
</tr>
<tr>
<td>User appraisal of search success:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>successful</td>
<td>74%</td>
<td>72%</td>
</tr>
<tr>
<td>unsuccessful</td>
<td>22%</td>
<td>18%</td>
</tr>
<tr>
<td>cannot judge</td>
<td>4%</td>
<td>10%</td>
</tr>
<tr>
<td>Success rate of library visits</td>
<td>88%</td>
<td>86%</td>
</tr>
<tr>
<td>Visitor catalog uses involving librarian assistance</td>
<td>7.8%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Demand for Librarian Assistance in Catalog Use

For library administrators and staff, a much desired impact of an automated catalog would be a reduction in visitors’ need for help or instruction from librarians when performing their catalog searches. Of course, one would also expect the introduction of any change in the public catalog to cause a temporary increase in demand for librarian assistance, until the population of library users became fairly accustomed to the new system. In this research, observations of visitors’ interactions with librarians during catalog use did indeed show the expected temporary increase in demand for assistance from librarians in performing or overseeing visitors’ searches. In the baseline week, there was librarian assistance in 7.8 percent of visitor use instances (see table 4). In the first follow-up, the level of assistance rose (to 10 percent), but it then fell back in the second follow-up.

The assistance level in the second follow-up week was 7.4 percent—just about the same as the baseline level. There was little, if any, difference in the librarian assistance levels at the online terminals and the microfiche viewers. In other words the catalog change does not seem to have had any long-term impact on the degree to which catalog users require librarian assistance. One may conjecture, however, that, because this research has established that the catalog change attracted many new catalog users, it is possible that the need for librarian assistance should continue to follow a downward course since the new catalog users, who presumably require the most assistance, will become relatively fewer in the future. This would seem to be worthy of investigation through further limited follow-up studies.

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Discussion of Results

The findings of this impact study tend to confirm and articulate some of the findings or conclusions of previous after-the-fact studies of online public catalogs. However, certain other findings of previous after-the-fact studies—and also certain prevailing assumptions about the effects of online catalogs—are not confirmed.

It is amply confirmed that library users will readily accept an online subject catalog as an alternative to a more traditional type of subject catalog. On the other hand, the traditional (microfiche) catalog continued to receive heavy, albeit much diminished, use. These alternative subject catalogs are not really identical with respect to the amount of information provided and the ways in which they can be accessed and browsed; such considerations would seem to be more important to many catalog users than whether catalog access is achieved through an online terminal or through some other device.

The findings of this research are consistent with three of the four items in Markey’s summary of the reasons why library users accept new online catalogs. One reason was the users’ perception of computer terminals as being more fun to use than traditional access means. While the truth of this idea was not specifically tested in this study, it was noticed that statements to that effect were made in many of the exit interviews with library users. Two other reasons for acceptance of the new catalogs were that the new catalogs provided either new informational service or else new access approaches not otherwise available; in other words, the perceived attraction in a new system can be in what is provided quite apart from the way it is provided, as discussed in the preceding paragraph. Studies to determine user “preference” among alternative catalog designs must always consider their substantive differences too.

The fourth reason given by Markey for user acceptance of online catalogs is that users believe that using the online catalog saves time. However, the present research did not confirm that belief. The average duration of a public catalog search remained almost eerily constant despite the introduction and acceptance of the new online subject catalog. The search duration profile found at NYSL was in fact quite similar to that reported more than fifteen years ago for searches of the traditional card catalog at Yale University. Also, Tolle found average search durations to be in a similar, quite narrow range when he studied transaction records for searches on a number of online public catalog systems. The averages and means reported by Tolle are about one or two minutes less than those found at NYSL, which is consistent with his use.
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of computer-interaction time rather than user observation as the measure of search duration; Tolle also found that within one major university, the average search duration ranged from four to nine minutes depending on the library branch being studied. From all of the present and previous findings, one might speculate that the duration of catalog searches is much more dependent on unknown characteristics of the user population, perhaps a mixture of physiological and educational attributes, than on the physical or informational features of catalog systems. If so, this could have important implications for revision of basic assumptions and objectives in catalog design.

In connection with the apparent insensitivity of average search duration to the change in catalog system used, one might speculate that users accomplish more (i.e., search more questions or pursue searches in greater detail) in an average session with an online catalog than with a more traditional catalog. This study does not provide direct evidence to test that hypothesis. However, it does provide indirect evidence that tends to refute the idea that users accomplish more in the average search session with an online catalog. It was determined that acceptance of the new online catalog and increased use of the public catalog by visitors brought no apparent change in the overall rate of visitors' satisfaction with the outcome of their library visits. If visitors had accomplished significantly more during visits because of their use of the new online catalog, one would expect to see the increased accomplishment reflected in a higher satisfaction rate. This indirect evidence suggests that, at most, any increased amount of searching that occurred was only enough to offset, in visitors' minds, their somewhat reduced success rate with online searching. To put it differently, if there was increased searching activity in the average search session when using the online catalog, that activity does not appear to translate into increased accomplishment as perceived by the users. Direct study to settle this question convincingly would be very desirable.

This research has provided direct evidence confirming that introduction of online subject searching capability increases the proportion of subject searches performed at the public catalog, something already established indirectly through the work of Markey and others.15 The increased proportion of subject searching appeared quickly among the visitor population, but more slowly among library staff. Overall, the proportion of subject searches almost doubled, from roughly one-fourth to roughly one-half of all public catalog searches.

A new finding from this research was that the introduction of online subject searching capability led to increased use of the public
catalog, in terms of the ratio of searches performed to the number of library visits in a given period. It was further determined that the increased use came from visitors who were previously nonusers of the public catalog, rather than from increased use by previous catalog users. These findings are consistent with the common knowledge of librarians that placing new catalog access terminals in a public area tends to stimulate catalog use.

An unexpected finding of this research was that introduction of the online subject searching capability was followed by a very sharp decrease in the use of the public catalog by staff members. One must be cautious about regarding this as a cause-and-effect observation since there are other plausible reasons for the change in staff use of the public catalog. However, it would seem to deserve further investigation.

Another somewhat unexpected finding was that, despite the shift in visitor use of the public catalog after introduction of the online subject catalog, there was no long-term change in the degree to which visitors made use of librarian assistance in performing their searches.

This research confirmed the observation derived from previous work that use of an online subject catalog tends to result in a somewhat lower rate of search success. It was found also, however, that online subject searching did not actually result in a higher rate of failure but rather in a higher frequency of uncertainty as to whether the search was a success or a failure upon completion of the search.

Obviously, more study at more libraries is desirable to test and clarify the findings of this research and to determine the degree to which they may be generalized. It is hoped that further study will be undertaken at NYSL to identify the impacts of subsequent modifications of the public catalog, building on this study as a baseline, in order to extend our basic understanding of catalog design and use.

References

Impact of an Online Subject Catalog


8. ________, A Study of Use of the New York State Library by Visitors; ________, Studies of Use of the New York State Library; and ________, "Monitoring Research Library Users in an Era of Rapid Change and Tight Budgets."


10. Markey, Online Catalog Use; and ________, Subject Searching in Library Catalogs.


15. Markey, Subject Searching in Library Catalogs, pp. 75-79.

16. Ibid., p. 89.
Online Public Access Catalog Research in the United Kingdom: An Overview

JANET KINSELLA
PHILIP BRYANT

Introduction

Despite the many statements that have been made about the rapid pace of technological developments in libraries—particularly advances in automation—it is surprising to reflect on how slow some of the developments have been.

The Centre for Catalogue Research (CCR) evolved from work that commenced at the end of the 1960s in the library at the University of Bath. Maurice Line, then the university librarian, had been offered the use of a terminal by the university's computer unit, and he wanted to experiment with the development of an online catalog which would use very brief entries. The catalog record as originally conceived by Line was extremely minimal—surnames only, short title, date, class number, and book number. The aim was for "direct access in the simplest possible way from all names or titles to the entry and its location, giving editors, etc. more or less equal status to authors so far as use of the catalogue is concerned."¹ As it happened, the terminal failed to materialize and the result was the development of the offline Bath Mini-Catalogue which used variable field records considerably shorter than those customarily provided in university library catalogs. Although the library was not, at the time, provided with its own terminal, Gillian Venner, who worked with the Computer Unit at Bath University from 1969-74 and who was recently a member of the Online Keyword Access

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to Public Information (OKAPI) team at the Polytechnic of Central London, set up a small experimental online catalog in the unit. The system permitted retrieval just by book number or by personal author name. The appendix of the Bath Mini-Catalogue report that described this experiment concluded by saying: "A large online file must earn its keep!"

The subsequent development of online catalogs in the United Kingdom has indeed been slow. As recently as April 1986, Juliet Leeves, speaking at the CCR's second National Conference on "Online Public Access to Library Files" held at the University of Bath, showed that commercially produced OPACs were only currently available in nineteen libraries (twelve from one supplier) and a number of these are public query facilities to circulation files. Very few of the systems yet offer all the features belonging to a true OPAC.

As Stephen Walker has pointed out, OPACs are information retrieval systems not unlike online retrieval systems such as DIALOG. Their important feature is that they have to be designed not to require a human intermediary. The research and development work required to achieve this goal is considerable and, until recently, the resources and moral support have not been available in the United Kingdom to assure significant progress. CCR was pressing for research in this area at the end of the 1970s but little progress was made until 1982. That year the centre undertook a series of surveys on the use of public inquiry facilities to circulation files and, in 1983, organized a number of one-day seminars entitled "Introducing the Online Catalogue." More significantly, in that year a start was made by the Polytechnic of Central London on the OKAPI project and the design of an OPAC to run on a local area network.

Recent Research

In the three years since 1983, there has been no shortage of research into OPACs. Work has fallen into two categories: (1) the study of existing systems; and (2) the design of experimental and prototype systems.

Many projects (and the majority of the work to be considered in this overview) have been sponsored by the British Library Research & Development Department; however, there has also been considerable research activity by individual institutions. Examples include the University of Hull, where papers have been produced by a special research group established within the library, and the Cranfield Institute of Technol-
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ogy which has been engaged in a major replanning of its total library service and where preparing for online public access has involved evaluation of some commercial systems. In addition to institutions, individuals such as Keith Renwick at the University of Manchester Institute of Science and Technology (UMIST), who has conducted a study comparing the use of various forms of catalog, have made their particular contribution to this area of research.

How relevant has recent research been to the needs of libraries and users? Has it changed the design of commercial online systems? An apparent gap between research and its application was just one of a number of factors that led in 1985 to the formation by the British Library Research & Development Department of a working group of researchers already active in the field to discuss current research and to identify future priorities. Five main areas for research were identified:

1. Systems design—e.g., search sequencing and intelligent browsing.
2. Impact studies relating to user behavior—e.g., monitoring of system use and changes in user behavior.
3. Impact studies relating to organizational change—e.g., monitoring impact of OPACs on resource allocation, staffing, and library structure.
4. Visual browsing/ergonomics—e.g., screen content, layout, typography, use of color.
5. Bibliographic factors—e.g., database enhancement, bibliographic standards, full text searching, multiple database searching.

As a result of the group's meetings, a Programme of Research was formulated and published by the British Library Research & Development Department in January 1986. In addition to the funding of current OPAC work, this report recommended the allocation of an additional £300,000 to OPAC research over the next three years. The program especially encouraged cooperative projects that involve working libraries cooperating with one or more research teams in the application of information retrieval techniques, evaluation, etc. Many of these projects will draw heavily on the techniques used in previous research especially in terms of monitoring and assessment. These techniques include: (1) feature analysis, (2) transaction log analysis, (3) questionnaire surveys, and (4) comparative studies. Such work has contributed greatly to our knowledge of OPACs, but the techniques do contain a number of inherent weaknesses.
Feature Analysis

This defines the nature of OPACs and aids the dissemination of information about systems to the library profession. For example, the recent survey of systems (including OPAC modules) in the United Kingdom by Juliet Leeves fulfills the need for factual information about "the marketplace."

Last year CCR concentrated on a particular aspect of OPACs in a "browse-screen" questionnaire that looked specifically at the display and format of brief bibliographic records and index entries by OPACs. Analysis of responses received from forty-one selected United Kingdom, U.S. and European suppliers and libraries with in-house systems demonstrated the great diversity in current OPAC design. For example, the length of a brief entry varies between systems as does the number of entries displayed. Not only is there a lack of consensus between the use of single-line and multiline, but also between displaying fixed length or variable length brief records.

However, feature analysis of this type is mainly a counting exercise; it rarely gives critical evaluation of the features enumerated. For example, the CCR study shows that just over half of United Kingdom systems surveyed (ten out of nineteen) would respond to all or some types of inquiry resulting in zero matches with a message (e.g., "no books found"). How helpful is this to the user? Surely a display of brief bibliographic records, or index entries, including the closest match would be of greater use.

Computer Logging and Transactional Tape Analysis

Considerable use has been made of this technique in the United States. Well-known examples of such research include the work by John Tolle of the OCLC Office of Research for the Council on Library Resources and by Christine Borgman of the University of California at Los Angeles whose research was supported by OCLC. In the United Kingdom examples of its use include work at Sussex University and by the OKAPI team at the Polytechnic of Central London.

Transaction logs enable researchers to quantify readers' exploitation of the facilities provided by a particular OPAC. Analysis of transaction logs at Sussex University Library demonstrated the changing pattern of use over two years, with the gradual increase in popularity of the "quick" search (i.e., 4,4 derived search key). Readers' ability to use systems should not be overestimated. Logs have indicated that users have difficulty with such tasks as reading instructions, responding to prompts, and keyboarding. Analysis of ninety-six OKAPI sessions identified spelling errors in about 10 percent of user input. One major
failing of transaction log analysis is that it is difficult to examine the patterns of use by individual users. Methods of delineating between sessions are not accurate and methods of obtaining information on the identity of the users (e.g., by asking for a user number), raise the question of confidentiality. A university community is not a homogeneous body in terms of ability. Even though users bring to the terminal differing amounts of experience in library, catalog, and computer use, transaction log analysis cannot identify characteristics of individuals. Users are restricted by the facilities provided by the particular system in use. They may require features, such as the facility to limit or broaden a search, that are not provided or are inadequately presented on the screen. Thus the results of a transaction log analysis may not reveal the real needs of users.

Surveys

Researchers in the United States have conducted large-scale surveys. On a modest scale, the Centre for Catalogue Research has carried out surveys at the libraries of Hull University and the Polytechnic of the South Bank where users had access to Geac online inquiry modules and at the Polytechnic of Central London and Bath University libraries where access was provided to certain elements of the SWALCAP circulation system. Over 800 questionnaires were collected giving information on users, their inquiries, and their views. However, surveys leave many questions unanswered. Would users have found items more quickly through another form of catalog? What were users' true understanding of the system? What errors did they make?

Despite the limitations of surveys, they are still important tools for the study of users' reactions and user characteristics. Surveys are the main data collection instruments for CCR's impact studies which are currently attempting to monitor changes in library use after the installation of an OPAC. Such "before and after" studies are taking place in four libraries (Coventry Polytechnic, Leicester Polytechnic, Devon Public Library System, and the Lancashire Library System) and cover a range of commercial integrated systems offering online public access (CLSI, BLCMP, DS, and Geac respectively). A questionnaire survey of library users (including nonusers of the catalog) is to be supplemented with brief semistructured interviews and observation of catalog use at selected periods over several days at each of the participating libraries.

Comparative Studies

Comparative studies have been, and are being, conducted using experimental methods. For example, in a series of small controlled
experiments organized by CCR and carried out by Linda Reynolds at the Polytechnic of the South Bank and by Hans-Ove Frid at Bath University, the use of the public inquiry facility provided by Geac and the SWALCAP Library Cooperative respectively was compared with the use of parallel files on COM microfiche. Users' performance was measured in terms of speed of, and success in, searching common and uncommon personal names correctly or incorrectly cited. When users were given correct citations they were able to retrieve the relevant titles faster in the online file; however, these studies identified possible sources of difficulty in online browsing. The user was less successful at retrieving titles online for which an incorrect personal name was cited.

**Current Research**

Studies based on existing systems have a number of inherent limitations. The control of variables is particularly difficult, and therefore results are not usually generalizable. Working with a commercial system within the constraints of a "live" library, it is often not possible to vary one feature of the system while keeping others constant. By designing experimental and prototype systems, researchers have attempted to solve such problems.

CCR for example has developed an experimental system for the study of interface design based on the information retrieval facilities of BRS/Search. The system, currently mounted on an Onyx 16-bit microcomputer, retrieves records from a specially constructed 3000 record database on education-related topics taken from Bath University Library's SWALCAP file. The user interface has been developed using the high-level programming language MENACE. The basic screen design consists of a three-part display showing system information, bibliographic information (in the form of full or brief bibliographic entries), and commands. “Help” information can be displayed by partially "wiping" the screen, allowing the user to view records, "help," and relevant commands simultaneously. The flexibility of the system permits the design and testing of a variety of experimental interfaces.5

Research at the Polytechnic of Central London has been based on the design of a prototype online catalog (OKAPI), developed for a microcomputer network allowing simultaneous access for up to twenty users. Great emphasis has been placed on making the catalog as user friendly as possible both in terms of system design and ergonomics. Users' reactions to existing OPACs formed the basis for the design of the OKAPI user interface. The traditional distinction between "known item" and "subject" searches has been maintained, but these searches
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are expressed by options to look for "a specific book" or "a book about something." Command input has been minimized to a single keystroke and brightly colored function keys have been incorporated into the keyboard for common commands (e.g., green to "continue" and yellow for "help").

Unlike earlier work which concentrated on the passive task of monitoring existing systems, experimental research has begun to be recognized as having an active role to play in the improvement of commercially produced OPACs. The success of such OPACs depends on three factors: (1) technical performance (both of systems and communications technology), (2) interface design, and (3) quality of the database. This multifaceted approach to OPAC design is clearly demonstrated in current research activity concerned with subject searching.

Technical Performance

One approach to improving subject access is by incorporating advanced information retrieval techniques into systems—e.g., automatic word stemming, spelling correction, and synonym generation. Analysis of OKAPI search sessions proved useful in identifying the potential of automatic word stemming. An analysis of 119 consecutive search statements, forming around seventy-two discrete OKAPI searches, indicated that a simple stemming procedure, conflating singular and plural noun forms and the verbal endings "ing," "ed," and "s," would have improved the performance of 23 percent of the statements. The work, being carried out by Stephen Walker, is based on Porter's stemming algorithm and involves the construction of a synonym dictionary and incorporation of stemming/synonym procedures into the OKAPI search program to enable all subject search words and personal names within specific item searches to be processed. The effectiveness of such techniques is to be evaluated through the analysis of user searches to be carried out through both the control and improved OPAC.

Other basic information retrieval research relevant to OPACs is being carried out in the field of relevance feedback. Examples include the work by Niall Teskey at the Department of Computing and Cybernetics, Brighton Polytechnic on the evaluation of various methods of ranking and by Stephen Robertson of the Department of Information Science, City University on the development of a front-end to Medline, providing weighting, ranking, and relevance feedback.

One approach to the application of relevance feedback to OPACs is being investigated by Stephen Walker at the Polytechnic of Central London. The research aims to improve subject searching by combining the use of subject information embedded within a classification scheme.
(e.g., Dewey Decimal Classification) with relevance feedback. Having asked the user to specify the relevance of records retrieved from a free language search request, the proposed system (based on OKAPI) will assign relevance weights to the user’s search terms and to the classification numbers of relevant records. The system will then automatically perform another search, presenting the user with related records.

The traditional approach to user-initiated subject access by information retrieval systems has been through the use of Boolean operators. However, many OPACs restrict their explicit use, offering only the implicit use of “AND” between terms. The OKAPI team rejected this simple post-coordinate approach to subject searching because of its lack of precision and have incorporated a complex hyper-Boolean facility based on an algorithm developed by D.J. Harper. Operating on the keywords found in the user’s subject search string, the system implicitly puts terms in an OR relationship, calculating a weight for each posting based on the frequency of the terms within the index.18

Interface Design

Research into the use of Boolean operators can also be approached from an ergonomic viewpoint. The CCR is studying alternative methods of presenting operators. For example, the experimental system includes a number of interfaces in which natural language explanations have replaced traditional terms (e.g., SELECT, INCLUDE, EXCLUDE, for AND, OR, NOT).

While the importance of research into “intelligent browsing” (e.g., relevance feedback, weighting, and Boolean search modification) should not be underestimated, “visual browsing” (i.e., the examination of data by the eye) also has a significant role in enabling greater ease of use. The CCR is undertaking a series of user tests, studying the effect of brief bibliographic entry length on “visual browsing.” Tests take the form of controlled experiments using the centre’s experimental system. For example, students are asked to identify particular titles within alternative “browse screen” displays. Initial indications from a pilot test show that single line entries are preferred by users and are quicker “to browse.”

Quality of the Database

The introduction of OPACs and other forms of online access to bibliographic data has renewed users’ interest in the subject approach to information. Many of the comments gathered from the CCR questionnaire surveys suggested that users would like to see the expansion of individual entries to include notes, abstracts, and contents pages.
Enhancement of the database to improve subject access may sound attractive but first data currently included in MARC records should be fully utilized. United Kingdom MARC records contain PRECIS (Preserved Context Indexing System) indexing strings. Their possible use in providing structured subject access to an OPAC is being investigated by Juliet Congreve at Middlesex Polytechnic. As with the Bath experimental catalog, work at Middlesex Polytechnic is based upon the information retrieval capabilities of an existing software package, in this case STATUS. The system has been designed to allow users subject access without their needing to know the structure of the indexing language. Terms are matched against a thesaurus which is held as two indexed sequential files, one arranged in alphabetical order of index terms, the other sequenced by the PRECIS Reference Index Number (RIN). The RIN file, by acting as an automated subject authority file, facilitates cross referencing to related records. The system translates the verbal form of a match into an RIN number which, when compared against the RIN file, identifies related records.  

Future Research

The OPAC Research Programme is already attracting a number of proposals for the British Library's consideration. Scarcity of resources in the United Kingdom means that it is essential that there is coordination of research effort and also that there is proper awareness of projects overseas—especially in North America and Europe. There has been an effort within the OPAC Research Programme to establish closer relations between OPAC designers and basic researchers in the field of information retrieval. There is, however, a need to widen the range of disciplines involved—psychology, ergonomics, graphic design, and so on. Unfortunately much of the research is limited by existing technology (e.g., interface design research is conducted with the standard eighty character by twenty-four line VDU screen) and becomes outdated as the technology changes. It is hoped that a greater emphasis on long-term, basic research could lead to results of general application. It is interesting to note that long-term work has been encouraged in Sweden. LIB-LAB, established at the University of Linköping and directed by Roland Hjerppe, draws on the experience and the talents of a range of disciplines (as recommended earlier) to develop a research laboratory in library and information science.

Conclusion

Frederick Kilgour has stated that OPACs will "profoundly change the way people go about the business of living." This is arguable.
Certainly there is a communications revolution which will effect a change, but OPACs are strictly concerned with providing access to bibliographic data in libraries and library-related systems. They are being developed in some quarters as public inquiry systems for the exploitation of a whole range of sources of data—e.g., community information, viewdata services, external databases, etc. It would appear that at present there is more than enough research to be undertaken in connection with the more conventional functions of an OPAC if the return on the investment in library collections is to be realized.

References

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OKAPI: Evaluating and Enhancing an Experimental Online Catalog

STEPHEN WALKER

This article originates from work carried out on the design and evaluation of experimental online catalogs at the Polytechnic of Central London (PCL). The research and development has been funded by the British Library Research and Development Department (BLR&DD) and the Department of Trade and Industry (DTI).

The initial phases of the project—investigation of relevant work, design and development of a prototype catalog, trial single-terminal installation at PCL, live evaluation, and publication of a substantial report—were carried out by a team consisting of Gillian Venner, Nathalie Mitev, and myself. These phases occurred from November 1982 to May 1985. The prototype catalog was named OKAPI (Online Keyword Access to Public Information).

After a hiatus of some months, further funding was granted by BLR&DD (starting in July 1985) to investigate various methods of improving recall or rather ways of reducing the considerable proportion of OPAC searches which fail for various reasons. This is referred to as the “fuzzy matching” project. Further funding has now been granted for a concurrent project on the use of relevance feedback during catalog searching.

To understand some of what follows it is necessary to have some idea of what the Mark 1 OKAPI looks like and how it behaves. There is a fairly full description in Designing an Online Public Access Catalogue by Mitev et al.²


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Environment

At the physical level, OKAPI operates on a local area network. The user stations are Apple IIe microcomputers equipped with Z80 cards. The stations are joined in a Nestar PLAN 4000 local area network, using network interface cards designed and supplied by Nestar. The network contains one file server station which is a 68000-based computer controlling a 140 megabyte Winchester disk drive with connection by coaxial cable. Data transmission is in variable-sized packets at 2.5 million bits per second, and the network protocol is described as a virtual ring. This means that devices can be connected and disconnected arbitrarily, provided there are no closed loops. If a station is connected or disconnected or fails for any reason, the network reconfigures itself and carries on without any noticeable complaint.

The User Stations

Apple IIe's were chosen because Nestar only provided network interface cards for Apples and for IBM PCs, and the IBMs were too expensive. In some ways the Apples are very satisfactory. They have proven extremely robust and reliable, and, apart from the auto-repeat function (which should never be provided on catalog terminals), the keyboard is very satisfactory. Most computer terminals are quite unsuitable for people who are inexperienced with keyboards, computers, numeric pads, and obscurely labeled function keys, and generally have too many keys. Watch a new keyboard user trying to pick out letters, make a space, or try to correct something. The Apple IIe has a few of these superfluous keys—such as ESCAPE, TAB, and some "arrow" keys—but these were painted red, yellow, blue, green, white, and black, and used as "function" keys.

Files and Storage

OKAPI uses a bibliographic file (source file) derived from the United Kingdom MARC format but reduced to nine fields. The source file is generated from MARC exchange tapes of PCL's union monograph catalog (some 100,000 bibliographic records). The nine fields contain:

— "main" author (i.e., MARC 1XX)
— main title (with subtitle and parallel title)
— publication data
— series and part titles
OKAPI

— "added" names (MARC 7XX)
— Dewey class number(s)
— subject headings (LC and/or PRECIS)
— control number
— accession number(s)

The length of the OKAPI records varies between about 150 and 800 characters, and the mean is under 250 characters. This reduction (compared with MARC's 800-1000 character mean) is partly due to:

1. personal names being held as surname and initials only,
2. no statements of responsibility,
3. no physical description, and
4. no notes (except contents notes for analyticals).

The choice of record content was influenced by the Centre for Catalogue Research Report which demonstrated that almost all catalog requirements were satisfied by a record that is very short indeed compared with a conventional entry.

The source file is held on the network file server's disk drive together with extensive indexing. There is no facility for amending or adding catalog records so OKAPI is entirely dependent on the normal PCL cataloging. As in many other United Kingdom libraries, there was a good deal of retrospective conversion at the time when PCL went over to microfiche. The records do not conform to a single consistent standard. Many have no subject headings, some have Library of Congress subject headings, some have PRECIS headings, and some have both.

OKAPI is almost entirely dependent on what is in the source file. There are no authority files and no cross references. (In United Kingdom MARC there are 9XX fields which can be used for see and see also references. At least one United Kingdom OPAC—the Cambridge University in-house system—has made good use of these fields.)

Access Points

The indexing provides for access by:

1. author or added name by "phrase"—(i.e., surname plus initials or corporate name;
2. surnames and individual words of corporate names;
3. title phrases (including series and part titles);
4. title and subtitle words;
5. 4/4 title/author keys from main title and all names (the user does not have to know how to construct these—they are generated automatically from users' input);
6. subject heading phrases;
7. subject heading words;
8. Dewey numbers; and
9. date of publication index (although this has never been used).

**Software**

Unlike almost all other online catalogs, each user station has its own copy of the search program and the top level indexes. All processing except access to the central disk store is carried out locally and is entirely independent of the system as a whole. Fixed data for screen displays are downloaded from the file server as required. This means that far more attention can be given to fine details of user interaction than is possible with systems sharing a single processor. To take a fairly trivial example, there is no need for commands to be terminated—e.g., by RETURN or SEND—and single keystroke commands can more readily be implemented than in conventional configurations. Also, response times for actions which are not dependent on disk access—such as returning from a full record display to a screen of brief records—are constant and do not depend at all on the overall load on the system.

Although the Apple is one or two orders of magnitude slower than the minis or mainframes used in most systems, the effect of the distributed processing is to provide a good deal more computing power than most other systems at a cost which is comparable or even lower.

**User Interaction**

These are some of the assumptions on which the design was based:

—most users are either looking for "a specific book" or for "books about something;"
—users who are looking for a specific book generally know both the author and the title (although they may not have a very accurate citation);
—users who are looking for books about something will rarely describe a subject in a form which achieves even a partial match with a subject heading. Furthermore, the language of subject headings is not current, inverted order is confusing and inconsistent, headings are often too broad or too specific to match users' topics, and subdivisions are not always helpful;
—a large number of catalog uses are casual, and users cannot be expected to be persistent, enterprising, or enthusiastic;
—The catalog must be instantly usable without any training, experience, or knowledge of either library practice and terminology or of computers and computing terminology—few people would know what a "corporate author" is: words like "entry" and "subject heading" and "control number" are meaningless to most people;
—every display should be self-explanatory—"help" which has to be requested is rarely used;
—screen displays must be very clearly laid out. Where choices are offered it is confusing to give more than four at a time. Many people have trouble deciding between more than two options. It follows that to avoid making the system tedious to experienced users, the system should respond to memorized sequences of command keystrokes without going through all the intermediate screen displays (this is something which is rather easy to implement on a distributed system).

The original design team (the authors of Designing an Online Public Access Catalogue) derived these precepts from a number of sources including study and observation of catalogs and their users, of interactive information retrieval (IR) systems in general, and from published material on online catalogs.

It may be felt that the result of working toward the earlier discussed design assumptions will result in a catalog which may be easy to use, but one which will not satisfy the needs of experienced users or those with specialized requirements. This view is cogently expressed by Anne Lipow. (It may also result in a catalog which is boring to use—see the concluding section of Lipow's article.) The primary aim of the OKAPI experiments is to determine whether it is possible to make an online catalog that satisfies the usability criteria while providing a high degree of effectiveness.

OKAPI tries to do this by behaving a little less mechanically than most IR systems. In a search by title and author, for example, if there is no match on both fields, OKAPI searches for each one separately and may find the given title but not the author or the author but not the title. In either case the user is informed that there is no exact match and is given the choice of seeing either titles or authors which may provide what the user was looking for.

These "search trees" are fairly elaborate and cannot be described here. In any case, since they were designed without precise knowledge of the types of and reasons for specific item search failures, they have proved not to be altogether satisfactory. In particular, it was not recognized that the most common cause of a "zero hits" result in specific item searches in a small catalog is that the library does not hold the item.
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sought. OKAPI tends to make the user continue fruitlessly. It is more helpful to the user to offer to search for the author only or for the title only while suggesting that “If you are sure you have the author and the title right, this book is not in the library.”

Operation of OKAPI

OKAPI’s initial screen offers a choice between searching for “SPECIFIC BOOK(S) (if you know the author and/or title)” and “BOOKS ABOUT SOMETHING.” If the former is chosen, there follows a form-filling screen requesting title, author (surname only, if a person), and initials. If the user does not enter anything in the title box, the search is processed as an author search. If the author box is left empty the initials prompt does not appear and OKAPI does a title search. No distinction is made between corporate and personal names in the index.

The result of a specific item search (in OKAPI Mark 1) is a display of matching records in the case of unequivocal success, a browsing display of the author or title index in the case of partial success, or a failure message (usually with an option to see an index display).

The subject search is extremely simple. The user is prompted to enter “word(s) or a short phrase which describes your subject.” The individual words of the query are looked up in the index for any source fields which may have subject content—i.e., titles and subtitles, subject headings, corporate names, or contents notes. If two or more words occur in the index they are combined using an implicit Boolean AND. If the AND fails (“no book exactly matches your search”) but at least three words of the query occur in the index, OKAPI carries out a “best match” search (“looking for similar books”). The user’s words are assigned weights which are inversely proportional to their frequency in the file. Thus, in “Skiing Holidays in Great Britain” the words skiing and holidays would have much higher weights than Great and Britain. Records are then ranked according to the sum of the weights of the words they contain in common with the query. The example query would result in the output of all records with skiing and holidays, then skiing or holidays, before records containing only Great Britain. A cutoff rule prevents the retrieval of records bearing little similarity to the query.

The procedure used for the best match search is similar to that in the National Library of Medicine’s CITE catalog, except that CITE also takes explicit account of the number of words common to the records and the query. Similar techniques have been used in a number of
OKAPI

experimental IR systems, and are now provided in one of the commercially available integrated library systems (the LIBERTAS system from SWALCAP Library Services Ltd.).

Evaluating OKAPI

One station was installed in PCL's Riding House Street site library in November 1984 and a further three stations in 1985. The users of this library are mainly undergraduate students of economics, social sciences, and communications.

The system logs itself comprehensively, and the usual raw statistical information can be obtained automatically. For example, the proportion of search types is roughly 40 percent author and title, 40 percent subject, 12 percent title only, and 8 percent author only. About 10 percent of searches contain at least one spelling or keying mistake. These are usually fatal in subject searches but often do not affect the result of author/title searches.

Some observation and interviewing has also been done. The initial results of this were reported in Designing an Online Public Access Catalogue. As with almost all online catalogs, the attitude of most users is favorable. What is far more difficult is to evaluate OKAPI's effectiveness. It is not sufficient to look for searches resulting in no retrievals. Much can be gained by "eyeballing" the transaction logs and by repeating real searches—particularly subject searches—to try to assess whether they were successful or not. The following two experiments are described in more detail in an article by Richard Jones (research officer on the current OKAPI projects).

Some Recent Experiments

Success Rate in Subject Searches

One of the major difficulties in using transaction logs to evaluate OPACs arises from the fact that it is usually impossible to determine session boundaries with reasonable certainty. This is simply because catalog users cannot be expected to sign on or log in. It is often quite clear from looking at a log that a sequence of searches was done by the same person. One sees spontaneous broadening or narrowing of searches, and one search following within a few seconds of its predecessor is almost certainly by the same person. Conversely, if there is a substantial period (say three minutes) during which a terminal was inactive, then there has almost certainly been a change of users. Unfor-
Fortunately the terminals are not usually unused for as long as three minutes.

In an attempt to estimate the success rate of users' first attempts at a search for a given subject, Richard Jones and this author carried out the following experiment. The logs of thousands of searches were processed to isolate those subject searches which started at least three minutes after the termination of the previous search (of any type). This resulted in a set of just under 300 queries. In some cases, of course, the selected searches were followed by further searches on apparently related topics, but this information was not used.

Each of these searches was repeated and the results were classified as "successful," "unsuccessful," and "indeterminate." The criterion for "success" was that, in the opinion of the experimenter, at least one record in the first ten retrieved was relevant to the query as understood by the experimenter. The results were that 62 percent were successful, 13 percent indeterminate, and 25 percent unsuccessful. About one-fifth of the unsuccessful searches were apparent collection failures (nothing relevant found after thorough searching).

It is obvious that the success criterion is not a very realistic one. It does not take into account users' varying requirements in, for example, exhaustiveness. While many OKAPI users will be satisfied by finding one book on their topic, some (a few) will be trying to do an exhaustive search or may already have seen the book(s) which the experimenters judged to be relevant.

It is tempting to say that the only criterion for measuring success is to ask the user, but this question can often only be answered after the user has been to the shelves and had a look at the book(s) and so cannot even be asked until after the session rather than the search is complete. What we were trying to estimate was the proportion of searches that are successful at the first attempt with the user's first spontaneous formulation of the subject. To put it a different way, how well does the terminology of users' initial subject search statements match the vocabulary of the source file?

It would be interesting to repeat the experiment using title words only and subject headings only, but the source file is not homogeneous enough to allow this. It is suspected that the majority of searches which succeed do so on title words rather than on subject heading words.

Success Rate in Author/Title Searching

Jones studied 214 consecutive author/title searches made at one station on three consecutive days. He found that 12 percent of these
searches failed to locate an item which the library held. (Some of these searches succeeded after reformulation or correction by the user.)

This figure is similar to those obtained by Dickson from the NOTIS system at Northwestern University library. She found that about 11 percent of author searches and about 14 percent of title searches failed to find entries which were in the catalog (these figures are deduced from the figures for the proportion of each type of search and the causes of failure which Dickson gives—a zero-hit search is classified as a success if it convinces the user, correctly, that the sought item is not in the library). Dickson’s initial selection of searches for study was made by scanning the logs for searches which resulted in no hits. The results are not strictly comparable (some of the NOTIS searches retrieved records without the users finding the one they wanted—e.g., “Smith, S” will retrieve everything from “Samuel Smith” to “Szymon Smith,” and it is a large library). It is almost trivial to say that the most frequent cause of search failure—for all types of search—is that the user’s terminology does not match that of the catalog.

Enhancing Subject Access

Current OPACs offer two (or perhaps three) approaches to subject access—i.e., by headings and by keywords. Some offer both methods, but how does the user know which to choose? (The third approach is not to offer subject access at all except via a printed subject index followed by a class number or shelf mark search.)

In searching by heading, there is the well-documented difficulty that users have in finding an entry to controlled subject headings. After all, subject headings were not designed for online searching—they are intended to be subject descriptions that users would recognize rather than be able to formulate. This difficulty in matching Library of Congress Subject Headings appears to be so general that subject headings are scarcely worth considering as the primary means of subject access in an online catalog.

Some United Kingdom libraries have built up subject indexes over the years in response to users’ queries. Many of the headings in these take the form of see references, but references can be used invisibly in an online catalog. There is no need for the user to know that the switch has been made. This is one of the devices which we are using in OKAPI Mark 2 (see discussion following).

For all their failings, subject headings undoubtedly can perform useful functions. One function is that of helping the user to recognize whether or not a retrieved item is likely to be relevant. Unfortunately,
many United Kingdom catalog records do not display subject headings. Even if the record does include subject headings, they cannot be displayed in brief entries. Hence, OKAPI Mark 2 generally displays all records in full—one per screen—following a subject search. Another function of subject headings is as a linking device—i.e., if a record is judged relevant, other records with the same subject heading may also be relevant, so the user should be given an option to "see other books described in the same way." (Unfortunately we can't do this in OKAPI because too many of the records have no subject headings—but classification codes can be used in much the same way.) It follows that postcoordination of the individual words or subphrases of the query should be the primary initial means of subject access.

Conventionally, in second generation OPACs, this is done by using an implicit Boolean AND. This leads to too many zero-hit searches. Most searches containing three or more words fail on an AND except in the very largest catalogs. There is little doubt that some form of "combinatorial" or "best match" search (as used in CITE, in OKAPI, and in the SWALCAP LIBERTAS system) is the best way of providing postcoordination. It has the additional advantage of automatically providing ranked output (users must be informed that "the most similar items should appear first") thus going a long way toward eliminating the problem of "too many hits." Few IR theorists would now hold that there is much to be said for conventional Boolean reference retrieval systems. They are of little use without trained intermediaries. The only satisfactory way of outputting records is in decreasing order of probability of relevance. However there is little agreement between theorists on how this should be achieved. The schemes used in the earlier-mentioned systems do have the merit of being relatively light computationally and of using a conventional inverted index structure.

Related Terms and the Synonym Problem

There remains the "synonym problem." A search intermediary knows that "infants" and "newborns" are to be treated as synonymous in a search for "Kidney disease in infants and newborns," but a computer program doesn't know this and a record containing both these words will be given a falsely high weight. The other side of the synonym problem is that of bringing in related words. An intermediary will often do this by using truncation to include morphologically related terms or by "ORing" such terms as "infants" and "newborns."
Automatic Stemming

Truncation can be done automatically—with reasonable precision—by using automatic stemming or suffix-stripping algorithms that will produce, for example, “comput” from “computer,” “computers,” “computational,” and so on. We tried this in OKAPI using a compact stemming procedure developed by Martin Porter.11 This has been tested on fairly realistic collections and searches and found to behave as well as explicit truncation by skilled intermediaries. Unfortunately, even fairly conservative automatic stemming does not always work well if it is applied to all searches. It can generate unacceptable amounts of “noise” if applied indiscriminately. It is particularly dangerous when applied to those OPAC subject searches (and there are many) which consist of only one word. It proved to be impossible to retrieve records on “communism” without retrieving everything on “communication.” An intermediary would not, of course, truncate “communism.” On the other hand, it is difficult to use linguistic knowledge in a computer program to decide when to stem and when not to.

One solution would be not to apply stemming to single term searches, but we think it may be better to use a two-stage stemming procedure. The first stage—weak stemming—reduces regular English plurals to singulars and removes the verbal noun suffixes “ing” and “ed.” It also conflates alternative spellings so far as this can be done without extensive look-up tables. It can, for example, cope with “iz” and “is” alternatives and with terminal “our”/“or,” but not with “aluminium”/“aluminum.”

The second stage—strong stemming—removes a fairly wide range of suffixes. The intended search procedure is to take the words of the user’s input, subject them both to weak and to strong stemming, and feed all the resulting terms into a combinatorial search with the additional rule that if a record is indexed both by the weak stem and the strong stem, no additional weight is given for the occurrence of the strong stem. We have designed a combinatorial search procedure that does this, and it will be evaluated later in the year.

Synonym Tables and Cross Reference Lists

Conventional subject indexes sometimes attempt to deal with terms that have related meanings but that are not alphabetically close by using see and see also references. For personal and corporate names, many
libraries use authority control, and there is no reason why an online
catalog cannot automatically switch from the form entered to the “pre-
ferred” form. However, Arlene Taylor’s study of failed name searches on
the NOTIS system at Northwestern University library,\textsuperscript{12} shows convinc-
ingly that name authority control, as currently practiced, would have
helped in only a small proportion of the searches. She concludes that
enhancement of the search programs to make them perform an auto-
matic “flip” of forename and surname and to retrieve the best possible
partial matches with user input would have been far more useful.

For subject searching in OKAPI Mark 2 we are incorporating lists
of “synonym classes” of subject terms. Here the word term means not
only single words but also phrases like “United States of America.”

Because of the wide subject coverage of most catalogs, care has to be
taken not to equate terms which are synonymous in one context but not
in others. For example, “plant” can be synonymous with “factory,” but
biologists will not want to retrieve material on the manufacturing
industry. In some cases, words can be equated when they occur in
specific contexts: for example, “underdeveloped” equals “developing”
equals “third world” when followed by “countries.” (Note that there is
no need for one member of a class to be regarded as the preferred form. In
the aforementioned example, “third world” is current and is the most
likely term to be used by searchers, but older material may be indexed
under either of the other terms, and all records should be retrieved no
matter which member of the class the user enters.)

Our list of synonym classes is derived from a study of the terminol-
ogy used in some 6000 OKAPI subject searches. Generally, one or more
of the members of a class is a noun phrase or an abbreviation. Some of
them serve simply to relate irregular plurals to their singular forms, and
some serve to handle alternative spellings—for examples where this
cannot be covered by a rule, see the following:

- “United States of America” = “US” = “USA” = “United States”
- “child” = “children”
- “BBC” = “British Broadcasting Corporation”
- “Tsar” = “Czar”

Incorporation of these synonym classes into the index involves the
use of a “go” list for phrases. Automatic indexing is extremely simple if
the index consists of words because there are very simple rules for
splitting a field into words. Using a “go” list at indexing time makes the
process slower and more complicated. The individual words of these
phrases also contribute to the index. A user looking for material on
“broadcasting” might well be satisfied by items indexed under “BBC.”
Spelling and Typographical Mistakes

There is a vast literature on the automatic detection and correction of keying errors, and this is not the place to discuss them in any generality. There are now computer programs which can automatically correct a large proportion of mistakes, but the more effective ones are computationally heavy. With conventional library automation equipment it is rarely possible to attempt spelling correction in real time. Such procedures also require very large dictionaries.

At the present stage in its development, OKAPI Mark 2 helps users to recognize possible mistakes by clearly displaying messages like "Can't find SOCIOLOGY." It also incorporates some modified Soundex-type indexes. The algorithm used is less "fuzzy" than the conventional Soundex procedure that reduces keys to four-character codes after removing all vowels (except an initial vowel). Our codes are not limited in length, and vowels or vowel groups (apart from terminal e) are represented by a single character. The procedure will therefore tend to give higher precision and lower recall than the standard Soundex. It will rarely produce a match if a word has undergone character transposition, but it quite often succeeds with errors which are misspellings rather than miskeyings ("sociology," "psycology"). In a sample of 621 subject words taken from the OKAPI transaction logs, 64 were misspelled but immediately recognizable to the human eye. Thirty-two of these would generate the same modified Soundex code as their correctly spelled equivalents, and in many cases this would have been unique (the Soundex key would only have arisen from one source word). This suggests that a considerable proportion of words which are (1) misspelled, and (2) occur in the index, could be automatically corrected by using a subsidiary index of modified Soundex codes.

The same modified Soundex coding has been applied to personal surnames. In this case, when OKAPI fails to find a surname and the Soundex code is present in the index, it displays a list of "names which sound similar" for the user to choose from. It is doubtful if this feature will be used much because OKAPI users seem to spell personal names rather accurately. Even when a surname is misspelled in an author/title search, the search often succeeds because the primary access is by a 4/4 author/title key which will ignore any errors after the fourth character of the title and of the author's name.

Relevance Feedback

Much research in IR has been directed toward investigating ways of automatically finding records that have a high probability of being
similar in subject content to those which match the terminology of the query. Such methods include clustering techniques (terms are divided into groups on the basis of their probability of cooccurrence, and the system will retrieve records indexed by as many terms as possible which regularly occur in conjunction with index terms matching the query), and the use of relevance feedback—i.e., the query is modified by, for example, adding terms from records judged by the user to be relevant to the query and then reprocessing the search. Harper’s thesis contains a rather comprehensive account of relevance feedback techniques.

The OKAPI relevance feedback project is concerned with investigating ways of obtaining relevance assessments, their reliability (how well can users judge the relevance of material just from a bibliographic description and subject headings), and how to use them automatically, in real time, to improve the precision and recall of searches.

After showing a record, the system can ask “Is this at all the sort of thing you were looking for?” Following a positive response there are various approaches that can be used automatically to reformulate and reprocess the search so as to try to find closely related records. In particular, other records classified at the same Dewey or LC number may well be relevant. The use of classification (Dewey or Library of Congress) alone will often decrease the precision of a search. This effect may be minimized by using a combination of classification together with title and subject words from relevant records. It may also be possible sometimes to exclude records on the grounds that they contain terminology in common with record(s) judged nonrelevant.

Conclusion

In a forthcoming review of the OKAPI report for Program, Charles Hildreth suggests, parenthetically, that OKAPI is not fun to use. This author agrees with him and also would like catalogs to be fun to use. They should allow those who are involved or interested enough to have a great deal of control over the search process and offer multidimensional browsing of related material. This author submits, though, with some trepidation, that (1) most of our files of bibliographic records and headings do not contain enough information nor information of the right kind, and (2) that it is more useful to the general patron to be provided with a catalog that produces good results most of the time without demanding much in the way of knowledge, experience, or skill. Most catalog uses are quite casual. They are attempts to satisfy a real need, but this is generally a need that the user feels should not demand much involvement on his or her part. Perhaps attitudes to catalogs will
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change if we offer OPACs that are both clever and easy—there are signs of this happening. It ought to be possible for the computer to determine a user's degree of skill, experience, and involvement, and to adjust its interaction accordingly. A future OKAPI project may be concerned with work toward the development of such a self-adaptive catalog system.

References

9. Ibid.
Beyond Boolean: Designing the Next Generation of Online Catalogs

CHARLES R. HILDRETH

Introduction

The online catalog will never be a finished, perfected product. Nor will the library catalog in its many online manifestations ever achieve the universal, familiar uniformity experienced by users of the twentieth-century card catalog. These twin realities threaten many librarians, represent a myriad of problems for catalog users, and challenge designers and developers of online catalogs to improve their systems specifically for the untrained occasional user of the library catalog.

Some writers view the online catalog as a new form of the library catalog, succeeding the earlier book, card, and COM catalogs. This perspective, although too narrow and unimaginative, has served as a useful point of departure for identifying the unique characteristics of the online catalog. Five years of examination and reflection have led this author to conclude that the online, interactive catalog has the potential to overcome all the major limitations of earlier forms of the library catalog (book, card, and COM). When its unique characteristics are fully understood, it becomes clear that the online catalog is far more than the traditional (read "card") library catalog executed in a new medium. Stated in somewhat general terms, the online catalog stands apart from earlier catalogs because it is interactive, infinitely expandable, and public.

As an interactive system, the online catalog can dynamically communicate with its user; it can be responsive and informative at a given time to a given need. The online catalog is "fence resistant." Its form

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does not constrain its development and expansion. Access points and pathways to the stored data can be continually added and redefined. Search, display, and support functions can be added or modified easily. Related data files (e.g., abstracts and book reviews) can be brought within the online library catalog. Linkages can be established between online catalog systems and other online information systems. Finally, the online catalog is public and very revealing of its use. Many of the mysteries of what actually takes place when a user is searching the catalog can now be solved. The searching activity can be logged (in its entirety, if desired) for examination and analysis. What users of the catalog actually do in the search process, if not why they do it, can be objectively ascertained. Patterns of search behavior, including encounters with problem situations, can be discovered for an entire population of users of a given online catalog.

The unique potential of the online catalog, together with the ever changing technologies that support online catalogs, leads to the inescapable conclusion that "we may have to adapt to a continuing state of mutability. The online catalog is not only an instrument of change in today's libraries, it is also everchangeable."

Automated library systems in general, and specifically online catalogs, will continue to be produced and enhanced from a variety of sources: in-house development, library consortia, and commercial firms. This will result in a diversity of online catalogs for some time to come.

Although dozens of different online catalog systems can be found in hundreds of libraries in North America and Europe, a determined observer can produce a "snapshot" (somewhat blurred and fuzzy around the edges) of today's online catalog scene. This article presents a brief overview of the state of the art of online catalogs. It discusses recent progress in the design and development of operational online catalogs, why the current generation of online catalogs falls far short of their potential, and what new directions for online catalog design should be expected.

Second-Generation Online Catalogs

In an earlier paper, this author introduced a classification scheme of three generations of online catalog developments to chart recent history and to cast some light on the likely course of future catalog design. This approach assumed we could identify qualitative stages of evolution in the design and production of online catalogs. Each of the three generations was defined by a characteristic set of features. No
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attempt was made to assign a fixed span of dates to any of the three generations. Conceivably, first-generation systems could be in operation in a world of second- and third-generation systems. The aim of the classification scheme was to generate informed criticism of the state of the art, especially those online catalog systems available in the library marketplace. This author did not expect that several commercial suppliers of online catalogs would subsequently refer to their new or updated products as "second-generation" catalogs.

The three-generation classification of online catalogs is useful once again, because it provides a framework for explaining precisely where online catalog development stands today. Almost without exception, we have moved beyond first-generation online catalogs. That is the good news. However, online catalog development has slowed to a snail's pace. Many of the commercial suppliers of second-generation online catalogs believe they have "finished" the job by adding online public access catalogs to their product lines. The danger exists that these commercial suppliers of online catalog systems will become stuck on the plateau of second-generation developments.

Several factors contribute to this apparent complacency: the vendors of turnkey library systems more and more have to assign scarce development resources to the support of existing installations. A vendor's choice of hardware architecture, software, and lack of imagination (read: "insensitive to the real needs of public access") may make it extremely expensive (or impossible) to provide enhancements that address more than the housekeeping tasks of a library. Kenneth Dowlin, director of the Pikes Peak Library District, suggests that most of the "integrated library systems" available in the marketplace "freeze the library into the housekeeping tasks phase and allow for little expansion" into later phases directed toward improving public access and public services. However, the commercial suppliers have demonstrated that they will respond to competitive pressures and the demands of librarians for additional functions and features. Witness the rapid development of subject access (however rudimentary) and some measure of authority control once these appeared as standard "requirements" in Requests for Proposals (RFPs) during the years 1982-1985.

Librarians must continue to play the role of change agent for the online catalog. But this will require that they make efforts to learn about the potential of online retrieval, catalog access issues that cannot be couched in the familiar terms of card catalog use, and user-system interface problems and promises. More importantly, a fundamental shift in priorities is needed. In her recent review of library automation
and networking developments over the past two decades, Markuson reminds us that most of our efforts have been aimed at automating the library and the functions of the librarians, not at automating access and retrieval systems for our users. The concentration has been "on control rather than access," according to Markuson, and she sees much "evidence of the continuing priority of control over access." Successful efforts to bring more needed information (beyond that contained in MARC catalog records) to the users of online catalogs, and efforts to make this new access instrument both easier to use and more effective, must be based on a radical shift in our priorities from bibliographic control to information access. This requires a shift in our demands from better automated systems for serving librarians to systems designed to more effectively provide direct service to library patrons, the "primary" users of our libraries.

This period of developmental slowdown or complacency on the part of the commercial suppliers of online catalogs has its positive side. For librarians who will be involved in the evaluation and selection of online catalogs in the future, it provides time for learning and "catching up" on the state of the art, online access issues, and users' needs. It is necessary to understand how today's online catalogs have moved beyond the first-generation systems. First-generation online public access catalogs were characterized as being "known item" finding tools, which provided few access points (typically only author, title, and control number) to short, nonstandard bibliographic records. They were either crude attempts to replicate the card catalog online, or automated circulation database query systems masquerading as public access library catalogs. Many agree with Malinconico's astute analysis of circulation control systems as falling far short of any system deserving to be called a library catalog. In first-generation catalogs, searching was initiated by derived-key input or by exact term or phrase matching on at least the first part of the term or phrase (as with heading searches in the card catalog). In addition to lacking subject access, including any keyword access to titles and subject headings, first-generation online catalogs provided only a single display format, a single mode of interaction with the system, and little or nothing in the way of online user assistance. Refining and improving a search in progress, based on an evaluation of intermediate results, was out of the question. Without subject access, authority-based searching with cross references, and meaningful browsing facilities, first-generation online catalogs were understandably criticized as inferior to traditional library catalogs.

Today's second-generation online catalogs represent a marriage of the library catalog and conventional online information retrieval (IR)
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systems familiar to librarians who search online abstracting and indexing databases via DIALOG, BRS, ORBIT, MEDLINE, etc. Improved card catalog-like searching and browsing (via headings and cross references) capabilities have been joined with the conventional IR keyword and Boolean searching approaches. Many online catalogs support the ability to restrict searches to specified record fields, to perform character-masking and/or right-hand truncation, and to limit the results by date, language, place of publication, etc. Also, bibliographic records may be viewed and printed in a number of different display formats.

Second-generation online catalogs should be viewed as bibliographic information retrieval systems. But when compared to their conventional IR forebears, these key differences should be kept in mind:

— the online public access catalog must be usable directly by untrained and inexperienced users (online assistance is usually provided to help with the mechanics of searching);
— records in the catalog database lack abstracts, the subject indexing is sparse and uses broad terms not representative of current terminology; and
— the catalog database, in covering a library's collection, includes information on a wide variety of knowledge fields and subject areas.

Designers of second-generation online catalogs have addressed these differences in two ways: by providing card catalog-like precoordinated phrase searching and browsing options (along with keyword/Boolean capabilities), and by providing more and more online user assistance in the form of menus, help displays, suggestive prompts, and informative error messages. On the other hand, post-coordinated keyword searching on subject-rich fields (e.g., titles, corporate names, series entries, notes, and subject headings) serves to alleviate the twin problems associated with the sparse subject indexing of most library materials by the Library of Congress (using its list of subject headings—"LCSH") and the users' unfamiliarity with the controlled indexing vocabulary.

A library catalog that fulfills Cutter's classic objectives for the catalog in the online environment is a significant accomplishment. It succeeds in at least two ways: users prefer the online catalog to either the card or the COM catalog, and the online catalog is easier to maintain and update than earlier forms. Designing a keyword/Boolean information retrieval system as an online catalog that is easier to learn and easier to use than the conventional, commercial IR systems is also a significant accomplishment. The traditional, well-structured library catalog has been joined with the power and flexibility of conventional IR systems.

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The prevailing temptation to be satisfied and to rest on our laurels is easily understood. We have come far, and the journey has been costly.

The Need for Further Improvements

Second-generation online catalogs can be used effectively by library staff and by library patrons trained to use and understand their particular indexing and search idiosyncrasies. Most of these online catalogs are not yet effective, usable "self-service" information retrieval systems for a wide variety of their users. These conclusions are based on a number of factors: personal experience with the use of dozens of online catalogs, numerous discussions with librarians who have monitored the introduction and use of online catalogs in their libraries, discussions with system designers with expertise in human factors engineering, and review of the findings of research studies on the use and users of online catalogs.

The potential of the online catalog to provide improved access to library materials and the information they contain is still largely untapped. Eventually, the forces of innovation and market competitiveness will boost online catalog development off the second-generation plateau. However, we should not expect a giant, discontinuous leap forward to the next generation of online catalogs. Rather, progress is likely to be made in small, incremental steps. Some of the new developments will almost certainly be technology driven. Combinations of new hardware, especially more intelligent workstations, and software techniques will be applied to new and improved library catalogs and retrieval systems. We will see more "WIMP's" (Windows, Icons, Menus, and Pointers) at the user interface. Already, the CD-ROM-based online catalog is being touted as yet another new form of the catalog. The danger is that future design and development efforts will neither be "user driven," nor incorporate the knowledge learned from information retrieval research and experimentation to improve conventional Boolean retrieval systems.7

Online catalog research studies have uncovered a number of common problems experienced by users of second-generation online catalogs. Solutions to these problems should constitute the design agenda for improved online catalogs. In general terms, the major problems include:

—too many failed searches (search attempts that are aborted, or that result in no matches—"0-hits"—or too many hits);8

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—navigational confusion and frustration for the user during the search process (Where am I? What can I do now? How can I start over?);

—unfamiliarity with or ignorance of the subject indexing vocabulary leading to the failure to match search terms with the system's subject vocabulary;

—misunderstanding and confusion about the fundamentally different approaches to retrieval and search methods employed in today's online catalogs (e.g., precoordinate phrase searching and browsing, and postcoordinate keyword/Boolean searching); and

—partially implemented search strategies and missed opportunities to retrieve relevant materials (e.g., searches in which large retrieval sets are not scanned or narrowed in size, and title keyword searches that are not followed by searches on the call numbers or subject headings of the found records).

Chan points out that online searching is a process of extracting a subfile of useful documents from a large file, a process where “in most cases, a sequence of search statements is required for even minimally satisfactory retrieval.” To optimize retrieval results in subject searching, more than one search approach may have to be employed in the overall search strategy: “Through combination, keywords and the [controlled] vocabularies of DDC, LCC, and LCSH should offer far greater possibilities in search strategies than any one of them can provide alone.” Markey has demonstrated, for example, that different records on a particular subject would be retrieved by using a classified approach from those retrieved using keyword or alphabetical subject heading browsing approaches.

Conventional IR systems place the burden on the user to reformulate and reenter searches until satisfactory results are obtained. This is typically the case with second-generation online catalogs as well. This approach assumes, however, that the user knows what he wants and can describe it in the language of the catalog database being searched. Hjerppe quite correctly rephrases this problem as the fundamental paradox of information retrieval: “the need to describe that which you do not know in order to find it.” Even the best second-generation catalogs do little to help the user transform an information need to explicit descriptions of the information understandable by the system. Nor do these catalogs lead the user from “found” information to related, linked information that has not yet been discovered. It is unrealistic to expect our catalog users to know in advance the structure and language of our library databases. It is equally unrealistic to expect online catalog...
users to be proficient in the various search approaches and techniques before they engage an interactive system in the retrieval process. Hjerppe reminds us that humans are much more adept at recognizing something than generating a description of it. Online catalogs could take advantage of this human facility by permitting requests such as Give me more like this!

In summary, second-generation online catalogs fall short in that they:

—do not facilitate open-ended, exploratory searching, by following preestablished trails and linkages between records in the database in order to retrieve materials related to those already found;
—do not automatically assist the user with alternative formulations of the search statement or execute alternative search methods when the initial approach fails;
—do not lead the searcher from successful free-text search terms (e.g., title words) to the corresponding subject headings or class numbers assigned to a broader range of related materials;
—do not provide sufficient information in the retrieved bibliographic records (such as tables of contents, abstracts, and book reviews) to enable the user to judge the usefulness of the documents; and
—do not rank the citations in large retrieval sets in decreasing order of probable relevance or "closeness" to the user’s search criteria.

Common Sense Enhancements

To move beyond second-generation online catalogs, we do not have to wait for the arrival of "fifth-generation" computers, or the "trickle-down" benefits of artificial intelligence (AI) research. Online catalogs can be made more intelligent, responsive, and usable employing already proven software methods. A measure of common sense, not AI, needs to be applied in our design efforts. The primary "common sense" assumption may be stated: All types of catalog users can benefit from additional interactive assistance and guidance, not only with the mechanics of searching and query formulation, but also with the selection and use of appropriate search strategies which may retrieve all materials of possible interest, or which may refine the search to produce precisely what the user is looking for.

With the aforementioned problems and shortcomings of second-generation online catalogs in mind, we can focus on a short list of attainable, commonsense enhancements. Some of these enhancements have already been incorporated in a few advanced online catalogs;
others are undergoing testing in experimental public access retrieval systems. The list begins with recommendations that are relatively easy to implement, followed by several that require more sophisticated software methods and database techniques.

Enhancements to the User-System Dialogue

Online catalogs have the potential to communicate interactively with the user as the search progresses. Even the simplest, most constrained search dialogues require transition through three to four different screen displays. As search and display options increase in more powerful systems, the network of possible screen displays and sequences of displays expands considerably. The searcher may not be familiar with specific search sequences or the overall network of displays available and may not be proficient in the mechanics (the "how to") of transversing the network, giving appropriate requests and commands to the system. New and occasional users of today's online catalogs often express a sense of disorientation, of being lost, not knowing what to do next, and thus they often underutilize the capabilities of the system. Some walk away in anger and frustration.

A usable online catalog will display, along with data retrieved from the database (e.g., alphabetical browsing lists of headings or keywords, ordered lists of citations, full bibliographic records, etc.), information informing the user of the status of the search in progress. This information should include the query as the system has processed it, basic navigational prompts (e.g., "BACK," "FORWARD," "START OVER," etc.), and instructions for additional, required retrieval actions or optional search methods (where available). Frequent, experienced users may wish to "turn off" this structured on-screen guidance mode. This should be allowed. As we do with the many highway, road, and traffic signs in our daily transportation environment, the experienced user will probably just ignore the status messages and prompts until the need for their assistance arrives. The goal is to make the online catalog comfortable and effective for occasional users who are not trained search specialists.

Markey has identified three major difficulties encountered by online catalog subject searchers:

— discovering the most appropriate subject heading to use in a search statement,
— increasing the results when no or too few records are retrieved, and
— reducing the results when a large number of records is retrieved.\(^\text{18}\)
Following a detailed analysis of each problem area, Markey presents an insightful list of suggested improvements to online catalogs, improvements designed to assist searchers overcome one or more of the difficulties. Short of incorporating automatic search routines which go into effect to reprocess the query when certain predetermined criteria of "failed" searches are satisfied, online catalogs can include a message-response system that tells the user to try available search and display options that offer ways out of the current difficulty. Any such message should tell the user what to do, how to do it, and why it may improve the results. In the case of no or few retrievals, the online suggestions may include shortening the search phrase or word, substituting synonyms or more general terms for the initial search words, or retrying the search using a different search method which may produce broader results. When an excessive number of records are retrieved (more than fifty or more than one hundred?), users seldom scan through the long lists of citations. Online suggestions addressing this problem could include asking the user to enter additional search words (with the system executing an implicit Boolean "AND" operation), or recommending the entry of limiting criteria to narrow the search results (e.g., date of publication, language, precise data field specification, etc.).

Automatic Correction of Search Term Spelling and Format Errors

Search failures (especially no matches) commonly result from misspellings of words and names. Several spelling correction or word approximation software routines are available to help with this problem. With systems having limited processing capacity (this is relative of course to the demands placed on the system at any time), routines that attempt to correct spelling or to find words that are orthographically similar to the entered word could be invoked only after a "no match" has resulted. While extending this additional effort, the system could inform the user what it is trying to accomplish.

Arlene Taylor has discovered that a large percentage of errors made in entering name searches results from the user not knowing the system's rigid requirements for the form and order of the elements in the entry. Typically, online catalogs require that personal names be entered last name first, followed by the first name and middle initial, if known. Frequently, users enter personal names in their natural, uninvited order. Flexible system software can easily handle this problem. The software could invert the word order where required, or conduct a keyword, Boolean "AND" search on the name's components, ignoring the order in which they were entered. Then, if no matches result, the

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system could reprocess the search using n-1 components of the name, etc. (such as the last name only, if this fact is discernible).

**Automatic Search Aids**

Most online catalogs assume that the display of a full bibliographic record represents a closure point in the search process. Online catalogs are generally inactive and silent at this point; one online catalog even displays the cryptic message, "The END." These assumptions are, of course, false. The bibliographic record contains data elements that link it with associated and possibly relevant records (authors, call number, series title, and subject headings). These linkages are not exploited in second-generation online catalogs. A single, relevant bibliographic record may serve as the "jumping-off" point for browsing a selected portion of the shelves, or it may be the point of departure for finding related materials. The user may wish to say, after viewing a bibliographic record, Great, I want more like this. The system could then use any of several methods to retrieve related records, including gathering all records in the database assigned one or more of the same subject headings or the same class number as the initial record. With a bit more design sophistication, the system could ask the user which data element in the displayed record (e.g., personal name, series title, specific subject heading, etc.) should be used as a gateway to related records.

The traditional distinction between "known-item" and "subject" searches is useful for designing search dialogues. In practice, the distinction blurs as one type of search may lead naturally into another type. A search for a specific work often becomes a search for materials related in some way to the work first sought. Transaction logs have shown that users of online catalogs frequently change from one type of search to another type during the same search session. When conducting a subject search, the user might discover a series of interest (and wish to see immediately all the titles in the series), or learn of an author who has been listed as an "added entry" (a useless concept in the online environment), then ask to see all of this author's works in the collection. The bibliographic record as displayed can serve many related retrieval purposes. It can also be a source of relevance feedback from the user to the system. Additional dialogue and automatic search routines can assist the searcher in tracking down related materials without requiring the user to continually reformulate precise, well-structured queries until satisfactory results are obtained.

Online catalog users display no desire to search in the disciplined, highly-structured, linear manner of trained search intermediaries who
aim to produce a well-defined list of citations for an end user. Miller and Tegler summarize the view held by many researchers that the scholarly process of seeking and identifying information to assist with a problem typically follows a more circuitous, cyclical, and unstructured path of browsing and discovery. This author suspects that this is also true of information seeking by the general public. We often do not know exactly what we want when we begin looking for it. The fuzzy model of information seeking activities implicit in this view should be incorporated into future online catalogs designed for scholars and general users. Efficient "known-item" and "known-subject" search methods should be retained as options for those searchers who know exactly what they are looking for.

Second-generation online catalogs offer both precoordinate phrase searching (by name, title, or headings as in the card catalog) and postcoordinate keyword searching using Boolean operators (and, in some cases, truncation, range, and proximity operators). The limitations and advantages of each approach in various types of searching have become well-known to those familiar with the online search literature. Searches on precoordinated subject headings, for example, can improve recall (the number of relevant records retrieved from a specific database) and in some instances, improve precision. But this places the burden on the user to enter (or to be guided to) the correct subject terminology. On the other hand, keyword subject searching on component words in titles or subject headings is a powerful, perhaps more natural, search method. However, this method frequently produces very large retrieval sets which include many nonrelevant records ("false drops"). When the exact title is known, a title-phrase search (matching words in exact order) is likely to result in a precise retrieval. A title-keyword search (matching words in any position and order) would have retrieved additional, nonrelevant records.

Chan recommends that a combination of these (and other) search methods be used in subject retrieval attempts, because in combination they "offer far greater possibilities in search strategies than any one of them can provide alone." The assumption here is that different sets of relevant records will be retrieved from an online catalog when different search methods are employed. Experiments by Chan and Markey appear to support this assumption. A combination of these methods would seem to increase recall. Unfortunately, searching in this manner requires an expertise that users of online catalogs are not likely to possess.

Mention has been made of online catalogs that judiciously suggest either alternative search formulations or alternative search strategies for
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the user to try when certain "failure" conditions arise. Another design approach, borrowing heavily from IR research and experimentation, involves programming the system to execute automatically a search in a variety of ways until satisfactory results are obtained. Usually some interaction with the user is required for eliciting judgments of relevancy and satisfaction. The selection of search formulations and search methods is carried out automatically by the system software. The user needs to know, or recognize, what he wants, but does not need to know how to search the database in an "expert" manner. For example, automatic stemming routines may be applied to search words to broaden a search. Truncating a search word to a common root may retrieve records that match any form of the search word—i.e., plural, singular, etc.

Based on a view of online searching as a multilevel, trial and error process of seeking, relevance judgment, selection, and discovery, some online catalog designers have incorporated a set of search sequencing rules which, using the results of the search at given stages, determine the course of the search. The "rules" determine which search method will be executed next based on one or more measures of success or failure including feedback from the user (other measures include similarity of words in the query to index terms, their frequency in the database, etc.). The LCS/WLN-based online catalog at the University of Illinois at Urbana-Champaign takes a no-match subject heading search and automatically reprocesses it as a title keyword search, assuming implicit Boolean ANDs between the search words. The retrieved citations are displayed a few at a time for relevance assessment by the user. If a citation is selected for "full" display, the user is guided to the subject headings assigned to the document and is encouraged to continue the search using the subject headings to retrieve related materials.35

The British experimental online catalog, OKAPI (Online Keyword Access to Public Information), uses a built-in "search decision tree" approach to establish a conditional search sequence for various types of searches the user may enter (author, subject, title, etc.).36 The search path followed once a search begins is determined by the preestablished rule system and conditions encountered by the system in interaction with the user (e.g., user's choice of search type, user's actual query, results from a previous retrieval, the user's feedback on those results, etc.). For example, the user may enter a title phrase; the system would execute an exact phrase-match search and display any matching citations. If no exact match occurred, the system would then automatically execute a weighted, combinatorial search retrieving records which had any of the search words in their titles and displaying the citations in a ranked order with titles having the greater number of words listed first.
Other optional search sequence rules that could be used following a phrase-match search include executing a word search with Boolean ANDs, or automatically stemming some words to improve the chances of retrieving something relevant.

These online catalogs represent attempts to make searching easier and more effective for untrained users by automating some of the "intelligent" judgments and activities of experienced search intermediaries. These activities include relevance feedback, stemming or truncation, finding synonyms, applying Boolean operators, and ranking some index terms as more important than others. CITE, the online catalog in use at the National Library of Medicine, incorporates a number of these automatic functions, including term weighting, combinatorial searching, and ranked display output. CITE's rich dialogue also suggests limiting measures that might be applied to a search in progress and always asks if the user would like to see items related to any displayed citation. Subject headings, call numbers, and free-text terms weighted heavily as important terms (based on an inverse document frequency measure) are used by the system at various stages of the search as "new" search words to retrieve related and potentially relevant citations.

Generally speaking, online catalogs can be enhanced in ease of use and retrieval effectiveness in three ways:

1. improving the user-system interaction with richer dialogue, online assistance, and online guidance;
2. enriching the catalog records and improving the structure of the bibliographic database; and
3. adding reference data files which supplement the catalog file.

**Enriching the Subject Vocabulary of Catalog Records**

Before concluding this section on commonsense enhancements, mention must be made of attempts to enrich and augment the bibliographic records in our online catalogs. The need for and value of enriching our bibliographic records with data extracted from tables of contents and back-of-the-book indexes has been established for some time. When indexed judiciously for online searching, the current, more specific terminology obtained from contents pages and book indexes can lead to vastly improved retrieval effectiveness and user satisfaction. The display of tables of contents after retrieval enables the user to make more meaningful judgments about the potential usefulness of documents in the collection.
Until very recently, adding later to the bibliographic record obtained from contents pages and back-of-the-book indexes has required a fair amount of skilled, manual labor. Editing must be applied to each publication to ensure only meaningful and informative words and phrases are selected to be added to the bibliographic record created for each work. Additional time is needed to manually key in the additional terminology. The need to keep down cataloging costs has been offered to explain why enriching the record has not been adopted in our national cataloging activities. Also, some librarians have expressed fears about the inconsistency that could result from the selection of words and phrases for these additional index terms. The cost issue is a serious one; how well the job is done is less serious. Any enhancement which adds indexable and displayable subject vocabulary to our sparse bibliographic records is better than none.

The online catalog, EIS (Engineering Information System), at Purdue University’s Seigemund Engineering Library has been enhanced through the addition of data from the edited tables of contents for most of the monographs in the library’s collection. This augmented monograph file is searchable by keywords, and the use of Boolean operators is supported. As new books arrive, library staff manually scan, edit, and subsequently input the tables of contents into the file. This file is very current, being updated (reloaded) weekly in the online catalog. The additional labor costs incurred by the library are believed to be more than justified by the increased search benefits to users. Both staff and patrons feel that subject searching of the monograph collection has been greatly enhanced. The number of search terms indexed per book has increased, thereby increasing the possibility of finding specific information in a particular book. Users of the Purdue online catalog are very happy with the expanded catalog because “the records augmented with tables of contents are searchable by terms in current use in engineering, obviating the necessity of mastering the intricacies of the LC (Library of Congress) subject classification.” Furthermore, when a bibliographic record is retrieved from the catalog, the user has the option of displaying its associated table of contents, permitting a more meaningful assessment of the potential utility of the book.

A related experimental project being conducted by the Bibliographic Services Division of the British Library bears close scrutiny, because it addresses the problem of reducing the time and costs associated with adding tables of contents data to MARC catalog records. The project aims to create a test file of United Kingdom MARC records augmented by words and phrases from tables of contents. Expanded
records for both monographs and conference proceedings may be included. The test file would be mounted on BLAISE-LINE (the British Library's online retrieval system), and perhaps other retrieval systems, for controlled evaluations by library staff and patrons. This project is unique because it employs a prototype digital page scanning system developed by OPTIRAM to automatically "read" selected tables of contents, editing and formatting the data according to criteria built into the scanning software. The process produces a machine-readable file of tables of contents for each publication that can be merged with the matching MARC records. The machine must be programmed to read a wide variety of printed tables of contents pages because no standard for layout, format, enumeration, and syntax, etc., is currently followed by publishers. If it succeeds, the project will significantly reduce the costs associated with the manual production of such augmented catalog records. Software may also be developed that will instruct the machine, after a scan of the title page, to identify the already-created catalog record stored in the database and to ascertain its unique control number. This would permit the entire process of scanning, editing, formatting, merging (contents and MARC records), and updating the catalog file to be accomplished automatically with very little manual effort. The machine scanning technique is proven and reliable. The challenge lies in developing the software to complete the editing and merging process.

Integrating Periodical Indexes in the Online Catalog

Library catalogs do not index the periodical literature held by the library. Library patrons wishing search access to the articles and reports contained in periodicals have had to use a variety of separately published abstract and index sources in print, microform, or online media. These gateways to the periodical literature have not been integrated with the library catalog in any of its forms in this century. Furthermore, the periodical publications these "global" indexes cover do not represent the actual periodical holdings of any particular library. Searching them successfully in print, microform, or online brings no assurance that the library holds copies of the relevant documents. Although the twentieth-century library catalog has had a monographic orientation, nothing seems more natural than providing access to a library's periodical literature through its online catalog. A user entering an author search in an online catalog may understandably wish to retrieve all the author's publications held by the library: periodical articles, technical reports, papers in proceedings, as well as monographs. A searcher with a
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subject information need probably does not care how the information that satisfies that need is packaged. A keyword search on titles or subject headings may represent a desire to retrieve documents of interest, regardless of the form in which they are published: book, magazine, newspaper, technical report, or scholarly periodical.

Adding "analytics" to the catalog record is costly and only goes so far in widening access to the library's periodical literature. The "fence resistant" online catalog provides us with an opportunity to break through barriers to the periodical literature inherent in earlier forms of the catalog. The necessary retrieval functions are already present in most second-generation online catalogs. All that is needed is to load from a global online abstract and index (A&I) database a subset of the bibliographic records that matches the issues of periodical titles actually held by the library. These A&I records would supplement the MARC catalog records in the bibliographic database. Indexes to the A&I records could be integrated with the indexes to the catalog records (for monographs, serials, etc.), or be maintained separately. In the latter case, the user could be offered a choice of bibliographic files to search: the "catalog" or the periodical indexes. A better approach would be to process an author, title, or subject search without regard initially to the form of publication which is indexed and which may result in a match.

Unlike library catalogers, most A&I database producers do not use the Library of Congress Subject Headings as their subject indexing vocabulary. But this does not present a very large problem for online catalog users. Researchers have shown that most (60 to 70 percent) subject searches in online catalogs do not use Library of Congress Subject Headings. Most catalog users do not seem to know what they are or what role they play in the catalog. They assume that the natural language terminology they use in their subject queries is also used in the catalog. Various kinds of keyword access are provided in today's online catalogs. Keyword queries on the A&I records in the expanded catalog database could be executed in the same manner as queries of the monograph file. Online catalog searchers could be guided to the no less familiar controlled subject vocabularies of the A&I file in the same ways they are now guided to Library of Congress Subject Headings, that is, via alphabetical displays of headings or descriptors (including broader and narrower terms from the thesaurus), or by special labeling of such subject descriptors when they appear in the displayed citation.

There are some practical problems associated with adding A&I citations to online catalog databases. Many different publishers produce online A&I files, and each file typically covers a specialized subject area. Many different A&I files would have to be acquired from various sources.
to cover the literature in most libraries' collections and to support the wide variety of subject searches conducted in online library catalogs. But, once again, any improvement is better than none. Online messages can and should be used to tell the searcher what is included in the library's online catalog. Lack of consistency in headings such as names of persons and organizations across files may cause difficulties, but loading and retrieval software can do a great deal to resolve this problem. Related headings can be "normalized" or linked together during database loading, and software retrieval techniques can be used to bring potentially related items to the user for assessment and selection.

General coverage A&I databases that use Library of Congress Subject Headings present a natural target for acquisition and loading into the online catalog. One such database is the "Magazine Index" published by the Information Access Corporation (IAC). "Magazine Index" covers several hundred popular periodicals held by most libraries. IAC also publishes online indexes of the business and legal periodical literature. IAC is mentioned here because they have entered into an agreement with the Division of Library Automation at the University of California to load and index selected portions of their A&I periodical databases into the MELVYL online catalog. MELVYL serves as the public access catalog at the nine University of California campuses. During an upcoming test and evaluation period, users of MELVYL (which is primarily a keyword/Boolean search system) will have access at one terminal to indexed magazine and periodical articles held by the University of California libraries as well as to the monographs in their collections. This represents a giant step forward. Now that H.W. Wilson, Inc. has put their indexes online, perhaps both tables of contents and book reviews will be added to our online catalogs in the near future.

**Conclusion**

Reflecting on the vast potential of the online catalog, Malinconico writes:

> There is little doubt that we are standing on the threshold of changes that will alter the catalog and library service in ways that we can only dimly perceive. The library catalog will very likely change into something that bears little resemblance to the instrument we currently know.33

With a bow to tradition and the conventional wisdom, Malinconico goes on to claim that the catalog in its online form will "remain the principal means by which readers help themselves to use the resources of the library."34 It is doubtful that this claim holds true for the present in
many libraries, and its truth is not guaranteed for the future. Today's online catalogs are not likely to serve and satisfy tomorrow's library patrons and other seekers of information.

Many suggestions for improving online catalogs, along with the motivation and rationale for each, have been discussed in preceding sections of this essay. The essay largely represents a compilation and reformulation of the ideas and efforts of many researchers and innovative system designers. It is hoped that this discussion, along with the others in this issue of *Library Trends*, will help librarians learn more about the problems of online catalog use and the promise the online public access catalog holds for vastly improved access to our libraries' collections.

A summary comment is offered to highlight the general aim of the many suggestions and recommendations that have been discussed. Enhancements to online catalogs should be guided by a principle which states: An online public access catalog should work intelligently with the user, engaging in meaningful dialogue, to elicit expressions of the user's information need (which may change during the course of the search), and to improve the results of the user's search activity.

Some corollaries of this principle can be stated as pleas to those responsible for the design and development of improved online catalogs:

1. Never assume the user can effectively navigate across an evermore complex database, presented with more and more sophisticated retrieval options, without generous assistance and guidance from the online system.
2. Never permit a search to fail and do nothing. The system should assume one or more records in the catalog will satisfy the user's need(s) and exhaust all approaches to finding those records until instructed by the user to stop.
3. Never assume the display of a bibliographic record represents the end of the user's search. Use the bibliographic record as a point of departure for related-item searching and browsing.
4. Never assume the user knows the "official," controlled vocabulary of the database, or understands the generative relationship between uncontrolled, free-text terms in a citation and the subject descriptors or classification numbers specially assigned to the document.
5. Never assume more useful information cannot be added to the online catalog. Patron access must be given priority over cataloger's control of the database. Especially never assume that the current MARC record contains enough displayable information to indicate the relevance and utility of a document to the user.

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Charles Hildreth

References

2. Ibid., p. 33.
5. Ibid., p. 11.
10. Markey, "Users and the Online Catalog."
13. Ibid., p. 188.
16. Ibid.
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22. Chan, “Library of Congress Classification,” p. 188.

23. Ibid., p. 189.

24. Markey, Dewey Decimal Classification Online Project.

25. Mischo, William, to whom I am indebted for many conversations and for sending me several samples of screen displays. Engineering Library, University of Illinois, Urbana-Champaign, Illinois, May 1986.


30. Ibid., p. 34.


33. Ibid.
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