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Public Terminal Use in an Online Catalog: Some Preliminary Results

The authors have studied the transaction counts from two and one-half years' activity at the public use terminals of the Ohio State University Libraries' prototype online card catalog to determine what search options academic library patrons use the most often and whether this pattern varies from that reported in major catalog use studies. The preliminary findings indicate significant differences in search strategy that may result from a unique user group that prefers to search the online catalog, more useful searches in the online system, or special search patterns imposed by the computer hardware itself. Both the different searches used by patrons and why they choose them should be important factors in the design of future online catalogs.

INTRODUCTION

Academic and research libraries recognize that for a variety of reasons they must now consider new forms of patron access to bibliographic information. Many of these libraries have had extensive experience in automating such internal routines as acquisitions and cataloging; this experience, however, provides little guidance in planning for alternatives to the manual catalog that library patrons can use. For some guidance library planners may turn to the major catalog use studies.[1] There also exist certain studies that analyze user acceptance and use patterns of commercial online databases.[2] Both of these may offer only minimal or tangential assistance, though, in predicting how patrons will respond to online or microform versions of the catalog.

Researchers have investigated library patron involvement with microform catalogs at the University of Toronto and the University of Oregon libraries.[3] Because few institutions currently have online public-use bibliographic systems, little research has been conducted on how patrons respond to and use computer terminals in searching bibliographic and holdings information. To help fill this gap, this paper analyzes the patron use of the prototype online catalog at the Ohio State University Libraries.

The Ohio State University Libraries has operated its Library Control System (LCS) for nearly ten years. The LCS database contains online holdings and circulation records for all of the 3.5 million cataloged volumes in the libraries' collections (1.5 million titles). The system is used to provide certain types of reference information, expedite order searching, handle general circulation routines, and aid in cataloging new material. In January 1975, a number of computer terminals were put in the main library lobby, so that patrons could use LCS directly without specialist or librarian intermediaries. From that time the number and level of use of these public ter-

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minals has grown steadily. Via these terminals patrons may search all cataloged holdings by author, title, author and title, call number, and browse the computerized shelflist. They may also search by Library of Congress subject headings for items cataloged since August 1977.

In order to understand how patrons have exploited the capabilities of public LCS terminals, the authors have collected data on the use of all public terminals from January 1977 to June 1979. At the beginning of the study seven public terminals had been installed in five library locations; by the end of the study twenty-one terminals were in nine locations.* By the end of 1980, there will be almost one hundred terminals available for use by patrons.

The overall objective of this study was to determine how patrons utilized public terminals and if this use differed in any degree from known patterns of use of the card catalog. The authors hypothesized that the change of mode of access—from search of cards alphabetized in card catalog drawers to keying searches into a computer terminal—would in fact produce a different search pattern. As a result the first specific task of the study was to identify the relative level of use of the available searches. The second specific task was to determine whether the pattern of use changed over time. The third task was to determine whether the introduction of new searches affects significantly the proportion of the various searches.

PROCEDURE

The authors chose to examine patron use of the public terminals for the thirty-month period extending from January 1977 through June 1979 for three reasons. First, the most complete data on patron use of public terminals were available for this period. Second, although additional terminals were installed during the period under study, library patrons had had access to public terminals in some locations for several years prior to the study, a sufficiently long period of exposure to allow the effects of the novelty of the system to have diminished. Third, certain significant changes and enhancements were made to LCS during this time period that permitted the study of the effects, if any, of the enhancements on the use of the prototype online catalog.

The patrons whose use of LCS is the subject of this paper were self-selected because, outside of specific class assignments, no one is forced to use LCS in place of the card catalog. Those patrons who do use LCS, however, quickly learn how to do the basic searches. Indeed, many come to prefer LCS to the card catalog because of the information LCS provides on the current circulation status and holdings. Informal surveys have also shown that there are patrons who do not like to use LCS and prefer to use the card catalog.[4] Since public terminals were available in the undergraduate libraries, the main library, some of the graduate reading rooms, and the larger department libraries, a large part of the patron community at Ohio State University was exposed to public-use library terminals and had an opportunity to use them.

All of the terminals studied were cathode-ray-tube (CRT) devices with the exception of one that was a thermal printer. At a number of points in the study, terminals of one manufacturer were replaced by those of others for technical and economic reasons. In any case, all terminals in place during the study had similar keyboards and operational features. Certain terminals, although designated as public terminals, were excluded from the study because their locations or because other factors caused them to receive substantially more use by staff than by patrons.

The authors will not present an extensive description of the operation of LCS since operational descriptions of LCS have appeared elsewhere.[5] However, the system has evolved to the point where only one such description captures the current state of the system.[6] Among the features of LCS is the ability to monitor the amount and types of activity on the system. Although these monitoring and report-writing capabilities have not been refined into a full-scale management information system, one of the reports provided the data for this study.

*At the beginning of the study, public terminals were in the main, agriculture, education, engineering, and undergraduate libraries; by the last month there were public terminals in the commerce library, the history, English, and foreign language graduate reading rooms of the main library, and the west campus' learning resources center as well. Nine public terminals were located in a bank near the circulation desk.

This report, the monthly transaction report, summarizes the total number of each type of transaction performed at each terminal during each month. For locations with more than one terminal, whether staff or public, the system provides a summary of the total activity for that location as well. The transactions that are counted for each terminal include all the search commands as well as commands to "turn" the pages of the display. Thus, a transaction is any command that the user enters. Thus, not all commands or transactions represent a search.

Because the authors were concerned with the patterns of searching LCS, they collected data only on the seven commands that demonstrated a choice of search (table 1). The authors chose to examine both the four searches that can be made in the manual catalog—title (TLS), author (AUS and AUT), and subject (SIS)—and three others that have no counterparts in the card catalog.

One of the latter, the combined author-title search (ATS), has no direct equivalent in a manual catalog. It exemplifies the new forms of access that a computerized bibliographic system can provide and was, therefore, included in the study. The shelf position search (SPS) displays the fifteen items on either side of the call number typed into the terminal. It was included because it resembles an important manual file search, and it provided a crude form of subject access prior to the introduction of LCS subject heading searching (SIS). On LCS a patron may also search a specific call number (DSC) to determine the location and availability of that item. Because of the versatility and utility made possible by this linkage of bibliographic with circulation information, this search was included in the study.

In addition to the information on the types of searches entered by patrons, data on the number of *invalid* commands they entered were also gathered. Commands entered incorrectly or resulting from improper operation of the terminal by the patron are rejected by LCS and counted as invalid. Excluded from the study were housekeeping commands that do not indicate a choice of search. Certain other commands that are used infrequently or can be employed profitably only by library staff also were excluded.

The monthly transaction reports give the frequency counts for the various commands at a given terminal in a given month. The fre-

TABLE 1

SEARCHES, COMMANDS, AND ASSOCIATED SEARCH KEYS

Type of Search	Command	Search Key Formation
Author-Title	ATS	First four letters of author's last name and first five letters of first significant word in the title.*
Exact Author	AUS	Exact spelling and punctuation of author's name as it appears in the author field of the LCS master circulation record.
Truncated Author	AUT	First six letters of author's last name and first three letters of author's first name in the case of a personal author. First six letters of first word in name and first three letters of second word in name in the case of a corporate author.
Call Number	DSC	Exact call number as it appears on catalog card, spine of book, or LCS record.
Subject Search	SIS	Any phrase whether authorized LC heading or not; search will display actual headings used at OSU that fall before and after the input search key.
Computer Shelflist	SPS	Any string of characters whether an actual call number or not; search will display the fifteen actual call numbers on either side of input string.
Title	TLS	First four letters of first significant word in the title and the first five letters of the second significant word in the title.

*A stop list is a list of words that occur with high frequency and thus would form search keys of low precision and high recall; all words on the stop list are not significant and are not used in formation of search keys. The LCS stop list for English language words is used for both the author and title fields of English language records; the stop list for foreign language words operates only on the title field of foreign-language records.

quencies for those commands identified as within the scope of this study (ATS, AUS, AUT, DSC, TLS, SIS, and SPS) and the number of invalid (INV) responses were transcribed from reports and keypunched. The authors then employed the Statistical Analysis System (SAS) to transform the raw frequencies of these commands into percentages of the total number of searches for each terminal for each month. The difference in total transactions among the terminals may vary by as much as a factor of seven due to differences in patron traffic. Conversion of counts to percentages of total transactions offered a method for comparing relative proportions of use from terminal to terminal and month to month. Because LCS provided two distinct types of author search but did not report the total number of author searches in the monthly transaction reports, SAS was used to total the author searches for each terminal in each month and compute the percentage of author searches to total searches as well.

Two other categories were computed as percentages of the total number of transactions (search plus housekeeping) at each public terminal. The first was the percentage that the total of the search commands (ATS, AUS, AUT, DSC, SIS, SPS, and TLS) represented of the total transactions at the terminals studied. Also, the percentage of invalid commands of the total number of transactions was computed to provide a measure of one type of patron failure in using both the search and housekeeping commands.

During the thirty months of the study, new commands and searches were added to LCS. Period I ran from January 1977 through July 1977, the time just before the introduction of the AUT search. Period II bridged the time from August 1977, when the AUT command became available, through May 1978. Finally, Period III ran from June 1978, when the SIS search became operational, to June 1979.

Then SAS was used to compute the mean percentages for each available search for each period. Initially the means for each search for each month were computed to determine if there had been a change in search patterns over time. However, patterns varied from month to month according to the vagaries of the academic year, which masked any significant long-term changes from period to period. Computing mean percentages for each search by period smoothed these monthly changes and made the differences from period to period more apparent.

Results

Use data for the public terminals observed during the study indicate these terminals have been well received by OSU library patrons. It is worth pointing out again that patron use of LCS is totally voluntary because the card catalog is still being maintained. Nonetheless, during the thirty months of the study, public terminals recorded 3,687,124 transactions, or almost exactly 20 percent of the 18,365,054 transactions registered by all terminals (public and others) on the whole system. On the average over the thirty months, there were about 128,000 transactions performed at all the public terminals per month, the actual figure increasing as more public terminals were added (table 2). In January 1977 the number of transactions performed at the public terminals was 63,569. In May 1979, the last month classes were in session in the study, the figure was 202,840. This represents a 219 percent increase in use over the period of study.

More than 1,845,000 searches were performed during the thirty months, an average of about 61,500 per month or about 738,000 per year at all the public terminals. These figures include just those transactions that represent a choice of search (ATS, AUS, AUT, DSC, SIS, SPS, and TLS) and do not include invalid responses or housekeeping commands.

In the main library alone, public terminals recorded an average of 84,862 transactions and 42,093 searches per month during the study. On the average approximately 1,018,000 and 505,000 searches were done at the main-library terminals per year. Lipetz estimated manual catalog searches at Yale to be on the order of 320,000 per year in 1969.[7] Projecting the figures of R. R. Palmer, patrons of the general library at the University of Michigan consulted or searched its catalog approximately 310,000 times during the 1967–68 academic year.[8] It can be seen that the number of consultations or searches of the LCS prototype online catalog exceeds the use of manual catalogs in two similar research libraries and that the level of use of the public

TABLE 2

NUMBER OF TRANSACTIONS AND SEARCHES, JANUARY 1977 TO JUNE 1979

Date	Total Transactions All Terminals	Total Transactions All Public Terminals	Total Transactions Main Lib. Terminal	Total Searches All Terminals	Total Searches All Public Terminals	Total Searches Main Lib. Terminal	Number of Public Terminals
January 1977	485,774	63,596	38,942	191,652	33,496	21,607	7
February 1977	629,821	96,055	61,513	263,494	52,956	36,266	7
March 1977	599,381	79,083	46,135	246,847	46,059	28,513	8
April 1977	572,796	84,774	48,933	254,600	48,370	29,536	8
May 1977	636,101	97,851	60,424	257,910	55,463	35,837	8
June 1977	476,055	51,021	29,817	193,397	28,948	18,517	8
July 1977	432,523	49,980	29,626	182,167	28,694	17,086	8
August 1977	457,038	45,804	26,122	201,203	25,434	14,941	11
September 1977	438,713	68,352	53,300	192,291	38,421	30,218	14
October 1977	688,214	148,387	112,893	298,773	79,250	61,413	14
November 1977	711,364	155,645	113,884	296,676	80,855	59,803	15
December 1977	438,235	59,033	42,987	183,810	32,330	23,412	15
January 1978	557,733	111,197	82,654	241,904	56,089	42,718	15
February 1978	703,550	154,072	115,702	310,961	77,863	58,178	15
March 1978	696,262	132,611	103,134	297,896	69,073	53,496	15
April 1978	692,616	146,872	108,330	304,990	73,594	54,168	15
May 1978	752,257	164,340	122,678	318,146	80,012	59,944	17
June 1978	500,766	82,122	63,230	201,863	40,467	30,688	17
July 1978	528,651	112,227	86,720	225,077	55,289	42,770	17
August 1978	531,236	102,749	80,241	226,986	50,867	39,428	18
September 1978	418,639	112,227	79,583	175,473	54,420	37,272	19
October 1978	768,053	211,585	150,960	316,477	98,883	69,345	20
November 1978	778,401	217,762	151,502	310,080	101,350	69,629	19
December 1978	479,793	84,772	51,712	181,343	42,271	24,644	19
January 1979	731,735	183,606	119,193	292,421	85,138	53,806	19
February 1979	763,878	202,053	137,962	300,278	91,974	61,959	21
March 1979	750,019	167,643	107,943	294,890	76,010	47,529	21
April 1979	737,314	188,205	114,672	292,777	84,499	50,956	21
May 1979	832,533	202,840	132,581	315,453	82,849	55,472	21
June 1979	571,603	110,006	72,503	220,479	51,690	33,646	21
Totals	18,361,054	3,686,470	2,545,876	7,590,314	1,822,614	1,262,797	

TABLE 3

MEAN PERCENT OF EACH SEARCH BY PERIOD AND
MEAN PERCENT OF SEARCHES AND INVALID COMMANDS OF TOTAL TRANSACTIONS

Search	Period I	Period II	Period III
ATS	27.8	23.2	20.6
AUS	19.5	8.9	5.1
AUT	N/A	11.9	14.1
Total Author (AUS + AUT)	19.5	20.8	19.2
DSC	18.7	18.8	18.4
SIS	N/A	N/A	4.9
SPS	2.8	2.7	2.5
TLS	31.2	34.7	34.4
Mean Percent of Searches of Total Transactions	55.3	52.3	47.3
Mean Percent of Invalid Transactions of Total Transactions	13.1	12.6	12.2

terminals was limited during the period of study by the availability of terminals.*

When one examines the percentage of use of each search and how it changed over time (table 3), one finds the most striking change in the use of the AUS search. A number of explanations might be offered for its steep drop in use from 20 percent in Period I to 5 percent in Period III. To use this search command the patron must enter the author of an item exactly as it appears in the author field of the LCS master circulation record. A transposition of characters or slight misspelling in the search key means that the desired results will not be obtained.

The nine-character search key of the AUT frees the user from having to spell the author's name exactly. Research findings show that users often approach the catalog with incomplete or incorrect information.[9] Furthermore, the AUS so reduced the response time of the computer that only one AUS search was permitted at any time anywhere in the system. Most likely as a consequence of its ease of use, the AUT author search appears to have replaced the AUS author search. During the last three months of the study the AUS stabilized at 2.5 mean percent of tl total searches. The sole remaining advanta of the AUS rested in its power to discrimina among corporate and certain personal autho whose names formed AUT search keys th produced great numbers of matches.

The mean percent of total author searchin (AUT plus AUS) for each of the three period did not vary by more than 1.5 percent. Thi low level of variation from period to perio would indicate that while patrons did no alter their overall amount of author searching they did demonstrate a decided preferenc for an easier, more forgiving author searc when such became available.

Patrons used call-number searches (DSC more frequently than had been expected. In all periods of study, the DSC represented almost one out of five searches at the public terminals. This level of use might indicate that patrons find information on the location and circulation status of library material as important as information as to whether the libraries own the item or not. The authors suspect that it also indicates that a substantial number of patrons are sophisticated enough to combine searching of the card catalog or some other source providing call-number information with searching of LCS. The minimal variation from period to period would suggest that call-number searching represents a basic requirement that patrons would have for an online bibliographic system.

*The number of consultations does not include the informational phone calls to the libraries' telephone center, staffed by twenty-eight half-time positions for 106 hours per week, answering more than 200,000 information and circulation calls per year.

The author-title search (ATS) dropped 7.2 percent in its share of total search choices from Period I to Period III. The greatest drop occurred between Period I and Period II when the AUT was introduced. Offering a more convenient author search may have caused patrons to alter their search patterns. Also, during Period II, serials-holdings information became available on LCS; however, it is not clear to the authors what effect this information might have had on the use of the ATS search.

The subject search (SIS), although the newest search, apparently has met an important need of LCS users despite the present lack of online cross-references and authority control. These capabilities are presently being programmed and should be available online in 1982. As a result of these limitations, library administrators urged library locations not to promote actively the SIS during the time covered by the study. However, use of this search increased without any formal promotion or instruction in its use. The first month that the SIS search was available it represented only 0.45 percent of the searches system-wide; in June 1979 it had climbed to 9.3 mean percent of searches system-wide. For the whole of Period III the SIS search achieved a mean percent of 4.9 percent of total searches.

The health sciences library staff decided that, despite its limitations, the SIS offered enough utility to justify training patrons in its use. In addition, one public terminal in the main library had instructional material on the SIS posted near it as an experiment. Subsequent to instructing patrons in the use of the SIS, one of the health sciences library terminals showed a mean of 12.8 percent of the choices during Period III. At the other public terminal in that library during the same time, subject searching on LCS was a mean of 9.5 percent of the searches. Subject searching at the main library terminal was 8.6 percent of the total searches at that terminal after posting instructions. Prior to that, SIS searching at that terminal accounted for only about 1 percent of the total searches.

Online shelflist searching (SPS) was added to the system in the mid-1970s. The SPS search allows patrons to enter a call number to retrieve abbreviated records for the fifteen items preceding and the fifteen following the call number that was entered. Because the patron does not need to enter the call number of an actual item in the collection, he can browse the whole collection by using the SPS as a crude subject search. The libraries have never actively promoted the possibilities of this search, which may account for the low level of use of this search at public terminals. During all periods of the study the mean percent of the SPS remained fairly constant and quite low.

In contrast to the findings of some manual catalog studies, the title search (TLS) demonstrated the highest overall percentage of searches during all three periods of the study.[10] Since serials-holdings information was available on LCS after Period I, the authors anticipated a steady increase in title searching as patrons came to rely on LCS for this information. Title searching did increase modestly from Period I to Period II, but it then dropped slightly from Period II to Period III. The availability of the SIS in Period III might have diverted some searches from the TLS, since some patrons had been observed using subject headings as search keys for the title search.

Searches form just a part of the total transactions performed at public terminals. The authors examined whether the overall proportion of searches to total transactions changed during the course of the study. During Period I searches were a mean 55.3 percent of the total transactions, and in Periods II and III, respectively, 52.3 mean percent and 47.3 mean percent. With the exception of the call-number search (DSC) and the subject search (SIS), all the searches required one additional transaction in order to display a record. The subject search required two additional transactions in order to display a record, and the call number search required no additional transactions. The authors have noted that when subject searching became available and was promoted, it achieved a significant share of the total searches. Because subject search requires two additional transactions to display a record, more subject searches will increase the total number of transactions at a faster rate. This may account for the lower overall percentage of searches in Period III. Also, if the availability of the AUT author search caused patrons to be more successful in their author searching, then they

might have performed more transactions to display additional records from their successful author searches.

The authors were also interested in how many invalid commands patrons were entering. A relatively high level of invalid commands might indicate, among other things, that the average person might have difficulty in using terminals to access bibliographic information or that the libraries' training materials were not effective. While efforts to train users increased during the study, more terminals were installed during that time, which meant more untrained users, presumably more error-prone, would be exposed to the system. A tension between these two factors might have caused the percentage of invalid commands to remain fairly constant, with the mean percent of invalid transactions decreasing from Period I to Period III by only .9 percent.

Conclusions

Three findings of this study may have implications for the design of future online bibliographic systems. First, a significant number of academic library patrons will accept and use an online alternative to the card catalog. The number of transactions performed at the public LCS terminals rose consistently over the two and one-half years of the study. Second, search patterns were fairly consistent despite increased use of the system and an increase in the number of search options. Even the number of invalid commands remained constant. Third, the amount of online title searching differs from that reported in a number of studies of the card catalog. About one out of every three searches on LCS was a title search, whereas about one LCS search in five was an author search. The author search, which the findings of major catalog use studies have shown to be the most favored search,[11] was the *third* most frequently chosen search by LCS users. Despite the fact that during the thirty months of the study LCS offered first a search that required the author's exact name and then a more easily used search, the level of author searching remained fairly constant.

The implications of these findings are more fully appreciated when viewed in the light of another finding of the catalog-use studies. Interviews with patrons using the card catalog showed that 60 percent of them came to the catalog with better title information than author information. In spite of having better title information, these patrons searched more by author in the card catalog.[12] Since it appears that title searching in the card catalog is more difficult, a major advantage of online bibliographic systems may be that they will make title searching viable and in the process will more closely align modes of access to bibliographic information with the ways patrons actually search for it.

This high level of title searching was unanticipated; in designing LCS the libraries offered a more precise option for known-item searching, the author-title search (ATS), which it was presumed patrons would prefer. The results of this study reveal, however, that this search currently accounts for only about 20 percent of the searches at the public LCS terminals and that its use has declined steadily throughout the three phases of the study. This search seemed to be the one most affected by the introduction of new, less precise commands, which do not require the user to bring as much information to his search. Perhaps we are seeing here the same phenomenon reported in studies of online systems by Briggs and Kobelski. Writing about users of online databases, Briggs reports:

> There are two indications that users are more severely discouraged by too few references than they are by too many. All of the users reporting too many answers still described the search as of some use. But 59 percent of the users reporting too few or no answers found their results of little or no use. Nearly all users reporting too many answers indicated that revisions were in order, but about one-half of the users with too few or no hits felt they did not have time to determine needed revisions or it was not worth the effort, or it was too late to be of help to them.[13]

Kobelski encountered the same responses from users and cites three possible explanations for this reaction: (1) a larger number of citations approximates a printed index that a searcher can browse to feel reasonably confident he has retrieved all relevant citations, (2) the high cost of online computer time in comparison to the very low cost of offline prints, and (3) student willingness to accept and use citations on a related subject along with those of their original topic.[14]

Future research in this area will have to

address several major questions. First, are the relatively stable search patterns found in this study independent of the design of this particular system and its community of users, or are they unique to this particular system and its users? Do the users of LCS form a special subset of library patrons employing unique patterns of searching? In other words, does a certain kind of patron with a certain kind of need for information choose to use the card catalog while another with different needs chooses to use the online system? Finally, do the stable search patterns result from unique design of the LCS hardware and software, or does the physical difference between the card catalog drawer and the computer terminal produce different patterns of searching?

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