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ABSTRACT

Users of optical data disk (CD-ROM) materials at the Main Library workstations of the State University of New York at Albany were surveyed to examine the problems they encountered while conducting their searches, identify factors that interfere with their task performance, determine their needs with regard to improvement in the databases they used, and evaluate the CD-ROM search service provided by the reference department. Data were gathered using a 12-item questionnaire completed by 200 non-repeat users (4 faculty members, 104 graduate students, 1 staff member, and 91 undergraduates) affiliated with the university. Results indicate that patrons made little use of workshops that the university had provided to introduce CD-ROM, and that they tended to request assistance rather than use the database search guides at the workstations. Graduate students were inclined to make better preparation for their searches than were undergraduates, but only a few patrons used Boolean logic to formulate their search statements. The responses and comments from searchers provide valuable information that library personnel can use to improve service. Twenty-one tables present study data, and an appendix lists some user suggestions. (Contains 12 references.) (SLD)

CD-ROMS AND USERS' REACTIONS

by

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Abstract

This paper describes a study that surveyed CD-ROM users at the Main Library workstations of the State University of New York at Albany to examine the problems they encountered while conducting their searches, identify the factors that interfere with their task performances, determine users' needs with regard to the improvement in the databases they used and the CD-ROM search service provided by the Reference Department. Data was gathered from 200 non-repeat SUNY/Albany affiliated users through a 12-item questionnaire. (A copy of the questionnaire is available from the author on request.)

The growth in the development of CD-ROM databases as a new and important access medium for bibliographic reference sources has been tremendous during the past few years. With the proliferation and increased availability of CD-ROMs, indexes and other information tools in CD-ROM format have become a favorite in library literature and are prevalently used in the academic and research libraries in the United States. CD-ROM producers always claim that their products are easy to use. From my experience, working at the Electronic Reference Station at the New York State Library, I have come to realize that no matter how user-friendly they are, there are still problems that users come across while they conduct their searches. In order to determine the potential problems, a survey was designed to investigate the difficulties the CD-ROM users encounter at the Main Library workstations of The University at Albany, State University of New York, and to identify the factors that interfere with their task performances. This data will enable librarians to find ways to improve the CD-ROM database searching services. Instead of measuring user satisfaction with CD-ROM products as most of the previous studies have done, this project focused on the problems identified by the users and their needs as well.

Many recent articles have investigated CD-ROM applications in academic libraries. Most of them concentrated on the responses of patrons to a variety of CD-ROM products and services in general. For instance, "Users' Reactions to CD-ROM: The Penn State Experience" presented by Cindy Faries[1] provided information about the user community, the most frequently used databases, users' perception of the help available to them, their desired type of instruction and suggestions for improving the services.

The study conducted by Ramona J. Steffey and Nikki Meyer[2] in the three libraries

of Vanderbilt University evaluated user success and satisfaction with various CD-ROM databases. The criteria used in their evaluation are ease of use, satisfaction with the number and quality of retrieved citations and the amount of time spent on searching.

Patricia Lynn and Karen Bacsanyi's[3] research reported on the development practice and success of five CD-ROM instructional methods explored at the Wayne State University Library. Survey results of patrons' using PsycLit, ERIC, Compact Disclosure and Social Sciences Index at the Purdy/Kresge Library were also included.

Two surveys, one designed for patrons, the other for faculty, undertaken in the summer of 1988 by Jean Reese[4] at the Vanderbilt University Libraries, focused on the impact of CD-ROM technology on library staff as well as on students and faculty members. Different aspects of impacts were described, such as increased workload for reference librarians, user training, furnishing the instruction aids, the increased requests of interlibrary loan and the drop-off of online searching.

The study conducted by Howard Silver[5] between January and March 1987 examined public response to MEDLINE, PsycLit, and Science Citation Index. In addition, topics related to the CD-ROM database service at the Hahnemann University Library were discussed. They include the instruction of hardware and software, staff training, changes in workload, access and promotion of the service, and bibliographic instruction.

Other articles examined experiences patrons had in using simply one product. The following are some of the examples.

Jo McClamroch, Linda Lawrence Stein, and Edgar Williamson[6] designed a questionnaire to elicit opinions from end-users about MLA on CD-ROM. Survey results

indicated that this product is easy to use for both the novice and the experienced searcher. Patron satisfaction was reflected by their positive comments about the system's currency, speed, printing and searching capabilities. The drawbacks concerning the respondents were lack of adequate printed documentation and on-screen instruction.

In Spring 1989, Somporn Puttapithakporn[7] identified and categorized problems novices users encountered in a database searching task with the Version 1.4 of ERIC on SilverPlatter. Thirty-three students enrolled in Introduction to Information Science at Indiana University-Bloomington participated in this study. The article served two purposes. One was to propose a taxonomy for analyzing user problems and errors as an evaluation tool to the performance of a CD-ROM search system and the other was to provide insights into potential improvements in the interface design and user training programs.

Pat Ensor[8] conducted a survey at Terre Haute Libraries of Indiana State University while the ABI/INFORM Ondisc CD-ROM database was available in a two-month free trial. Respondents consisted of users in business schools and non-business schools. User satisfaction with search results made ISU decide to subscribe to the product.

The study undertaken during the second half of February 1988 by Peter M. Lepoer and Carol A. Mularski[9] investigated the reactions of both new and experienced users to the Compact Cambridge MEDLINE on CD-ROM available in the Ohio State University Health Sciences Library. Findings revealed that most patrons seemed to be satisfied with the availability of the system even though very few users were able to formulate totally efficient search statements due to lack of training or experience.

Some of the literature compared the use of a printed index versus a CD-ROM index.

The research done in Oakland University's Kresge Library by Kim Schultz and Kristine Salomon[10] asked students to compare CD-ROM and printed versions of ERIC, PsycLit, and the Business Periodicals Index. The participants were twenty-five business, nine psychology, and eight education students. Their results showed that CD-ROM versions of those indexes were faster and easier to use; besides, the overwhelming majority of the students surveyed would use CD-ROM indexes instead of printed indexes next time when they had to do their searches.

Prosperous as they are, CD-ROM bibliographic indexes are not always the winner. An experiment performed by Carol Reese[11] proved this fact. Seventeen students from Brookdale Community College, Lincroft, New Jersey were divided into two groups. They were asked to research the same questions either on InfoTrac II CD-ROM database or in the manual index, Readers' Guide to Periodical Literature, to see which index provided them with better access to relevant information. The statistic data indicated "Readers' Guide" to be more effective.

Articles comparing different products also exist. Gillian Allen's[12] "Patron Response to Bibliographic Databases on CD-ROM" is an example. This study examined patron response to and success in using six Wilsondisc bibliographic databases and the Info Trac General Periodicals Index in the Undergraduate Library at the University of Illinois at Urbana-Champaign. The methodology incorporated observation of patrons' searches and questionnaires completed by the participants. Regarding patron satisfaction with search results, the median responses were positive. In terms of the need for CD-ROM instruction, "agree strong" that training was not required was the median response selected. It was also

observed that InfoTrac searchers employed more search statements and had more failures compared to Wilsondisc users.

CD-ROM REFERENCE SERVICES AT SUNY/ALBANY

Background

The University at Albany, State University of New York, is one of four university centers in New York State's public university system with over 16,800 students, of which approximately 5,000 are graduate students. The full-time faculty consists of 620 members, and they teach both graduates and undergraduates. The Main Library serves a diverse student population plus an array of faculty, staff, and community members.

In February 1987, the Library obtained its first CD-ROM product, ERIC, on trial. Due to a shortage of funds, when the trial period expired, the CD-ROM was returned to the vendor. In March 1988, hardware was installed to provide end-users with access to ERIC and PsycLit on CD-ROM. The CD-ROM facilities were housed in the basement of the Library in the same area as the online search service. By Fall 1989, three more databases were on subscription and the number of terminals was increased to four. In addition, the CD-ROM area was moved upstairs to the location where it is now. In the summer of 1990, the number of workstations were expanded to eight and they were networked to meet the large demand in the use of CD-ROMs by end-users. In January 1991, the Library had eleven workstations in total, of which three were stand-alone. At the time of this survey, databases available on the network were ABI/INFORM, Academic Index, PAIS, Newspaper Abstracts Ondisc, ERIC, CaDiLaC, GPO Monthly Catalog, MLA Bibliography, PsycLit,

Social Science Index, and Sociofile. Fifty-four databases could be accessed at stand-alone workstations. Since the new technology is strongly favored by the users, the Library has committed heavily to the use of CD-ROM products. The total uses of CD-ROMs during the period of July 1991 to October 1992 was ninety-five thousand times, and more than ten thousand times in November 1992.

CD-ROM Service And User Assistance

The CD-ROM area is located right behind the Reference Desk. The workstations have been set up in the form of a horseshoe, the three stand-alone terminals are on the right, and the help desk is in the middle. The service is available to all library users any time the Library is open. Throughout the academic year, products may be used between 8:00 a.m. and 11:00 p.m., Monday through Thursday, 8:00 a.m. to 10:00 p.m. on Friday, 8:00 a.m. to 8:00 p.m. on Saturday and from noon to 11:00 p.m. on Sunday. User assistance is usually available from 9:00 a.m. to 10:00 p.m. Monday through Thursday, and 9:00 a.m. to 6:00 p.m. on Friday and on a limited basis on weekends. The CD-ROM reference librarian, who is a librarian or a graduate assistant from the masters program of the School of Information Science and Policy at SUNY/Albany, provides one-on-one, immediate assistance to anyone who needs help while conducting a search on CD-ROM. Assistance varies from putting more paper in the printer to giving brief instruction in how to conduct a search, depending on the kind of help the user needs and how much time the librarian has to devote to one user. When the CD-ROM reference librarian is not on duty, librarians working at the Reference Desk provide assistance to the user.

Reservations

Because of the heavy use of the workstations, the user may reserve time to search CD-ROM databases. Reservations are strongly recommended during the busy periods of the semester. Stations that are not reserved are available on a first-come first-serve basis. Reservations may be made in person or by telephoning the Library Reference Desk. Reservations should be made in the appropriate notebook in the CD-ROM area. One notebook serves workstations on the network and one serves stand-alone workstations. When signing up a stand-alone workstation, a specific database should be reserved as well. Reservations are limited to one hour per day for up to two hours per week and may be made up to two weeks in advance. A user arriving for his/her appointment is entitled to ask anyone using the terminal to vacate.

Documentation

Thesauri and user manuals specific to the databases offered are kept on the CD-ROM help desk. Printed database search guides are displayed on a rack to the right of the entrance of CD-ROM area. These search guides are created by SUNYA librarians. The content of the guide includes a description of the database, time period covered, corresponding printed and online sources, thesaurus information and an explanation of the function keys and fields. The simple search procedures, logic operators, truncation symbol, method for displaying records, information on printing and downloading, how to obtain on-line help and a sample record are also introduced. Users, especially first-time users, are encouraged to consult them.

Workshops (Training Sessions)

The Library has offered CD-ROM training sessions for about three years. During the Fall semester 1992, forty-seven workshops were held at the Library. They began with the first session on September 9 and ran through December 3. Instruction was offered for the following databases: ABI/Inform, Business Periodicals Index, ERIC, Medline, MLA Bibliography, PAIS, PsycLit, Science Citation Index, and Sociofile. In addition, a General Introduction workshop was provided. The aims of the workshop are to increase user effectiveness and reduce the workload of novice user instruction on reference staff. These workshops teach end-users to search a database efficiently in order to develop a customized bibliography. End-users can also learn how to print retrieved citations or download them to disks. The instruction program is offered free of charge and is taught by SUNYA librarians. Each session lasts approximately one hour. Workshops on ERIC, PAIS, PsycLit, Sociofile are held at the CD-ROM workstations; while the General Introduction workshop and workshops on the other databases are held in a classroom in the Library. Class size is limited to provide end-users with individual attention. First-time users and users who need extensive help are encouraged to enroll in a workshop.

Course-Integrated Bibliographic Instruction

In addition to the CD-ROM reference librarian, database search guides, workshops, the CD-ROM course-integrated bibliographic instruction is available, too. This type of bibliographic instruction program is offered at the request of faculty, and it provides group instruction to students in accordance with specific subject classes. The content of each instruction varies depending on the requirements set up by the course instructor and the subject being taught. The degree to which CD-ROM searching techniques are taught is based on its applicability to each individual subject.

THE SURVEY

Purpose of the Survey

The purpose of the present study was to

1. Investigate the problems the CD-ROM users encountered while they conducted their searches.

2. Determine users' needs with regard to the improvement in the CD-ROM databases they used.

3. Find out the preferred instruction programs they wanted.

The results will enable us to find the ways to enhance the services, as well as the systems, in order to maximize successful end-user searching on CD-ROM.

The Survey Instrument

The survey consisted of twelve questions. This two-page instrument solicited information on institutional affiliation, previous searching experience, purpose(s) for doing the search, CD-ROM database(s) used, how to learn to use the system(s), search strategies, problem(s) encountered, evaluation of the system(s) used, search results, priorities for improving the system(s), and instructional methods recommended. An open-ended question was included to ask for users' comments and suggestions. The questionnaire was designed to be anonymous and was kept brief and simple in order to encourage people to participate.

Conducting the Survey

The survey was conducted from November 4 to November 10, 1992. This time frame fell in the middle of the semester and contained no holiday breaks. The researcher spent approximately thirty-four hours, in blocks of two to four hours, at various times of the day including evenings and weekends, administering the survey. Like many other surveys that

attempted to evaluate user response to CD-ROM products, the researcher was not able to gather a truly random sample of the target population. Therefore, the data was collected from the first 200 non-repeat SUNY/Albany affiliated users. During the designated survey blocks, green signs which stated "CD-ROM Survey in Progress" were put on the help desk and at each workstation. As a user completed his/her search(es) and was ready to leave, the researcher approached the user, explained the nature of the survey and asked him/her to voluntarily fill out the questionnaire. Library staff and non-SUNY/Albany affiliates were eliminated. 242 users were approached, of which 18 were non-SUNYA, and 24 were not willing to participate because of time constraints. Since the users surveyed did not see the questionnaire until they finished their searches, the responses given were absolutely their own perception about the service.

SURVEY RESULTS

A profile of the 200 respondents shows that a majority were either graduate students (52%) or undergraduates (45.5%). The remainder was comprised of SUNYA faculty (2%) and staff (0.5%). The total and the percentage of each category under the user status are tabulated in Table 1.

Table 1
CD-ROM Users by Status

	Faculty	Graduate	Undergrad	Staff	
Total	4	104	91	1	200
%	2	52	45.5	0.5	100

In the area of previous search experience, 25 respondents(12.5%) were first-time users. Of the 175 people who had prior experience, 67 (33.5%) have used CD-ROM databases 1-5 times and 40 (20%) of them were undergraduates: 35 people(17.5%) indicated that they have searched CD-ROM databases 6-10 times; 17 persons (8.5%) have used the products 11-15 times, and 56 people (28%) claimed that they have experience over 15 times, of which 37 (18.5%) were graduate students. Overall, every faculty member and staff person who filled out the survey had CD-ROM search experience more than 15 times, 47% of the graduate students had prior experience more than 10 times, while the majority of the undergraduates (64%) had CD-ROM experience fewer than 6 times. The level of experience by user status revealed that the faculty and staff were the most experienced, followed by graduates, with undergraduate students far less experienced. Table 2 shows the relationship between the users and their prior CD-ROM experiences.

Table 2
CD-ROM Users and Their Prior Experiences

	Faculty	Graduate	Undergrad	Staff	Total	%
0		7	18		25	12.5
1-5		27	40		67	33.5
6-10		21	14		35	17.5
11-15		12	5		17	8.5
over 15	4	37	14	1	56	28.0
Total	4	104	91	1	200	100

With regard to the purpose of doing CD-ROM searches, participants could have selected multiple responses. The largest percentage of users (78%) were using the CD-ROMs for a "research paper/project," 47% checked "class assignment," 13% worked on

"thesis/dissertation," 10.5% looked for "professional information," and 5.5% specified "other" including personal interest, assistantship, learning how it works, interview, publication, etc. Although the responses indicate a varied use of the workstations, finding information for research paper/project was the primary purpose of all users no matter what status they were; while "class assignment" was the secondary reason of both graduates and undergraduates. Table 3 summarizes the findings.

Table 3
Purpose(s) of searching CD-ROM by User Status

	Faculty	Graduate	Undergrad	Staff	Total	%
Class assignment		50	44		94	47
Research paper/project	4	80	71	1	156	78
Professional information	1	16	3	1	21	10.5
Thesis/Dissertation	1	21	4		26	13
Other purpose(s)		6	5		11	5.5

Note: Sometimes the user did more than one search for different purposes, so the total searches is over 200, and the sum of the percentages is over 100.

During the duration of the survey, a total of 23 CD-ROM products were involved in the study. Of the 200 users, 52 (31 graduates, 19 undergraduates and 2 faculty) searched more than one database to retrieve information. The most commonly used products were Academic Index (50 users or 18.4%), ERIC (43 users or 15.8%), PsycLit (38 users or 14.0%) ABI/INFORM (28 users or 10.3%) and Newspaper Abstracts Ondisc (21 users or 7.7%). The least used were Library Literature, Population Statistics, County Business

Patterns and Congressional Masterfile; each of these files were accessed by one user only. In general, databases on stand-alone workstations were used far less than those networked. When broken down by user status, graduate students used ERIC the most, while undergraduates used Academic Index most frequently. Table 4 on the next page indicates the status of users for each use of the individual CD-ROM products.

When asked to check all the methods by which they had learned to use the system, 52.5% of the users said that they learned by "trial and error," 45.5% learned from librarians, 26.5% figured out how to work on the product by means of reading the "help screen," 21.5% were taught by friends/classmates, 17.5% learned by attending workshops and 17% consulted handouts(database search guides). Upon close examination, it can be seen that the percentages for individual patron categories do not follow closely with those of the entire group. In both the graduate and undergraduate categories, over 50% of each user population tended to try by themselves, and over 40% relied on the services of the librarian, while 100% of the faculty and staff received assistance from a librarian and only 25% of the faculty learned by "trial and error." The percentage of graduate students who used the help screen, handouts and attended workshops is almost twice or more than twice as those of undergraduates for each of these means of learning. "Friends and classmates" played a role in assisting the undergraduate population. Table 5 summarizes the instructional aids employed by users by their status.

Table 4
Use of Individual CD-ROM Database by User Status

	Faculty	Graduate	Undergrad	Staff	Total	%
PsycLit	2	19	16	1	38	14.0
Medline	1	4	1		6	2.2
*Acad. Index	1	21	28		50	18.4
*Bio. & Agri.		1	2		3	1.1
ABI/INFORM	1	11	16		28	10.3
MLA		7	3		10	3.6
ERIC		38	5		43	15.8
SSI	1	4	5		10	3.7
Sociofile	1	6	6		13	4.8
BPI		5	2		7	2.6
Art Index		1	1		2	0.7
*Disser. Ab.		5	1		6	2.2
Newspaper Ab.		8	13		21	7.7
Library Lit.		1			1	0.4
PAIS		5	5		10	3.6
CaDiLaC		5	3		8	2.9
Disclosure		2	3		5	1.8
GPO		1	2		3	1.1
NTDB		2			2	0.7
SCI		2	1		3	1.1
*Pop. Statistics		1			1	0.4
*Co. Bus. Pat.		1			1	0.4
*Cong. Master.		1			1	0.4

Note: *Acad. Index = Academic Index
*Bio. & Agri. = Biological & Agricultural Index
*Disser. Ab. = Dissertation Abstracts Ondisc
*Pop. Statistics = Census Data on Population and Housing
*Co. Bus. Pat. = County Business Pattern
*Cong. Master. = Congressional Masterfile

Table 5
Means Employed to Learn CD-ROM Database(s) by User Status

	Faculty		Graduate		Undergrad		Staff		Total # of use	** %
	Total	* %	Total	* %	Total	* %	Total	* %		
Help Screen	0		39	38	14	15			53	26.5
Handouts	1	25	22	21	11	10			34	17
Librarian	4	100	44	42	42	46	1	100	91	45.5
Workshop	0		26	25	9	10			35	17.5
Friends	0		20	19	27	30			47	23.5
Trial & error	1	25	57	55	47	52			105	52.5

Note: * the percentage of individual group
** the percentage of the total users

For people who had no prior CD-ROM experience, librarians were the most commonly used instruction source. The more experienced the users were, the more they used the help screen, took advantage of the workshop, asked friends or classmates for help and learned to figure out how the system works by "trial and error." The percentage of people who have searched CD-ROMs over 15 times and consulted the handouts (database search guides) was more than twice as those of other less experienced groups. It surprised the researcher that even though they are the most experienced, over 45% of them still relied on the instruction provided by the librarians, instead of attending the workshops. Table 6 on the following page reveals the relationship between the avenues of learning the systems and the user's prior experience.

Table 6
Means of Learning CD-ROM Database by User Prior Experience

	0		1-5		6-10		11-15		15+		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
Help Screen	6	24	19	28	7	20	5	29	16	29	53
Handouts	3	12	9	13	3	9	2	12	17	30	34
Librarians	14	56	31	46	15	43	5	29	26	46	91
Workshop	3	12	12	18	7	20	6	35	7	13	35
Friend	3	12	18	27	11	31	5	29	10	18	47
Trial & error	10	40	32	48	18	51	11	65	34	61	105

The next question that the researcher asked was "Did you spend time developing your search strategy?" The purpose of this question was to find out whether people thought about a search strategy before sitting down at the computer. If they answered "yes," then they were asked how they formulated their searches. Some people did more than one search, so they gave multiple responses. Of the 200 participants, 26 (13%) did not know what search terms they should use. They were 9% of the graduate students and 19% of the undergraduates. The overwhelming majority (70%) thought about the key words to be searched in their head. Only 12.5% thought about all the possible search terms and put them down on paper. Fifteen percent looked up the thesaurus on the CD-ROM database. Faculty and graduate students used the thesaurus more than undergraduates and staff did. Very few people (7%) said they used Boolean logic operators to formulate their search statements on paper. They consisted of 9% of the graduates and 5% of the undergraduates. Compared with other user groups, the most experienced had more control over the search terms they should use. In addition, 25% of them put all the possible key words on paper before doing their searches and 14% used Boolean logic operators to formulate their search

statements. The groups that had searched CD-ROMs more than 10 times made more use of the on-line thesaurus than those who were less experienced. Table 7 presents the findings by user status, and Table 8 shows the search strategy employed by user groups with different levels of experience.

Table 7
Search Strategy Use by User Status

	Faculty		Graduate		Undergrad		Staff		Total	* %
	Total	%	Total	%	Total	%	Total	%		
No strategy used			9	9	17	19			26	13
Key words in head	3	75	71	68	65	71	1	100	140	70
Possible terms on paper	1	25	14	13	10	11			25	12.5
Online Thesaurus	1	25	23	22	6	7			30	15
Boolean logic operators			9	9	5	5			14	7

Note: * the percentage of total respondents
Since some users did more than one search, the total searches is over 200, and the sum of the percentages is more than 100.

Table 8
Search Strategy Used by User Prior Experience

	0		1-5		6-10		11-15		15+		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
No strategy used	5	20	14	21	3	9	4	24			26
Key words in head	17	68	45	67	29	83	11	65	38	68	140
Possible terms on paper	1	4	6	9	2	6	2	12	14	25	25
Online Thesaurus	3	12	9	13	2	6	4	24	12	21	30
Boolean logic operators	2	8	1	1	3	9			8	14	14

The rest of the questions on the survey is the core of the investigation. By asking "What factors influenced your search?", the researcher intended to find out the problems or difficulties the patrons had while they conducted their searches. Forty-nine patrons (24.5%) said they had to wait to use the terminals. The same portion of patrons claimed they had to make an appointment beforehand. These were common problems in all categories of users. Thirty-nine patrons (19.5%) revealed that they did not know what databases they should choose until they asked the librarian. This was reported by 15 (14%) of the graduate students and 24 (26%) of the undergraduates. Forty-one or 20.5% of the total patrons did not know how to retrieve relevant information more effectively by using Boolean logic, thesaurus, etc. Twenty-five percent of each category of the faculty and undergraduates had this difficulty, while only 16% of the graduate students had this problem. Forty-four (22%) of the surveyed users indicated that they were not sure whether the citation retrieved was relevant to their search topics or not. Faculty and staff did not have any uncertainty about the information they retrieved. Twenty-one or 20% of the graduates and 23 or 25% of the undergraduates had trouble in judging the relevance of the retrieved citations. This phenomenon is not unusual since the patrons had not read the articles or books by the time they filled out the survey, it was not easy to see the relevance by just looking at the citations. It was a good thing that the computers never went down during the period of the survey, but 6 (3%) of the patrons pointed out that the screen froze while they were doing their searches. The detailed statistics of the problems encountered by user status is provided in Table 9.

Table 9
Problems Encountered by User Status

	Faculty		Graduate		Undergrad		Staff		Total	%
	Total	%	Total	%	Total	%	Total	%		
Have to wait to use	2	50	20	19	26	29	1	100	49	24.5
Have to make appointment	1	25	26	25	22	24			49	24.5
Unfamiliar with keyboard			1	1	7	8			8	4
The screen froze			4	4	2	2			6	3
Printer problem			10	10	13	14	1	100	24	12
Computer went down										
Help key not useful			6	6	5	5			11	5.5
No immediate assistance	1	25	4	4	5	5			10	5
Database to choose			15	14	24	26			39	19.5
Not enough search time			18	17	11	12			29	14.5
Using Boolean logic	1	25	17	16	23	25			41	20.5
Citation uncertainty			21	20	23	25			44	22

It was also observed that the problems of waiting to use terminals, making reservations, and being uncertain about the usefulness of the information found were universal no matter how much CD-ROM experience the users had before. Nevertheless, only users with prior experience less than 11 times had the keyboard problem. In addition, users with less experience had more problems of not being able to get immediate assistance

from the librarian, had more difficulties in selecting the appropriate databases they needed, and had more trouble in using Boolean logic or the online thesaurus. Table 10 tabulates the relationship between the problems confronted and user status under the categories of prior experience.

Table 10
Problems Encountered by User Prior Experience

	0		1-5		6-10		11-15		15+		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
Have to wait to use	5	20	16	24	10	29	5	29	13	23	49
Have to make appointment	5	20	18	27	9	26	2	12	15	27	49
Unfamiliar with keyboard	2	8	6	9							8
The screen froze	2	8	2	3	2	6					6
Printer problem	2	8	6	9	6	17	6	35	4	7	24
Computer went down											
Help key not useful			3	4	2	6	2	12	4	7	11
No immediate assistance			7	10	2	6			1	2	10
Database to choose	7	28	25	37	4	11			3	5	39
Not enough search time	2	8	14	21	6	17	1	6	6	11	29
Using Boolean logic	6	24	18	27	10	29	2	10	5	9	41
Citation Uncertainty	6	24	15	22	7	20	5	29	11	20	44

In order to explore the major drawbacks of the systems available, the researcher asked the patrons to make evaluation of the products based on the first database they used. Just over twenty-one percent (21.5%) complained about the lack of flexibility in combing search statements; 15% thought the systems were slow, and 12.5% felt that the information on the help screen was not specific enough. In regard to the content-related problems, 20% considered the years covered by the systems not long enough. Another complaint was the lack of abstracts. Table 11 displays the findings by user status. The breakdown of problems related to individual database is given in Table 12.

Table 11
System Problems Found by User Status

	Faculty	Graduate	Undergrad	Staff	Total	%
Slow Response time	2	17	10	1	30	15
Lack of flexibility		24	19		43	21.5
Inadequate menu description		7	5		12	6
Need to switch disks		3	2		5	2.5
Date range not long enough		17	23		40	20
Does not have abstracts		10	8		18	9
No listing of titles		7	6		13	6.5
Marking problem		9	7		16	8
Error message not informative		3	3		6	3
Help screen not specific		12	13		25	12.5

Table 12
System Problems by Individual Database

	A	B	C	D	E	F	G	H	I	J
PsycLit	3	6	1	2	5	2	5	3		5
Medline	1	1		3						
Acad. Index	1	7	1		7	2	1			2
Bio. & Agri.			1							2
ABI/INFORM	8	4	1		5		1	2		3
MLA	1	2			1	2	1	1		
ERIC	7	10	3		5	3	2	2	2	8
SSI			2		1	1				
Sociofile	1	4			1	3	2	1	1	
BPI		1			1	2	1	2		
Art Index					1					1
Disser. Ab.			1		2	1		1		1
News. Ab.	6	4	2		3	1		3	1	2
Lib. Lit.					1	1		1		
PAIS					2					
CaDiLaC		2			2					
Disclosure	1				1				1	1
GPO					1					
NTDB		1								
SCI										
Pop. Statistics					1					
Co. Bus. pat.	1	1								
Cong. Master.										

Note: Problem A: Slow response time
Problem B: Lack of flexibility
Problem C: Inadequate menu description
Problem D: Need to switch disks
Problem E: Date range not long enough
Problem F: Does not have abstracts
Problem G: No listing of titles
Problem H: Marking problem
Problem I: Error message not informative
Problem J: Help screen not specific

The researcher was also interested in the problems of specific product lines, so the database used was classified into four groups: SilverPlatter, Wilsondisc, UMI and "other." The results showed that UMI products had the most serious problem of slow response time. The most inadequate description of menu items was produced by Wilsondisc. Additionally, this product line had the greatest problem of not providing abstracts, and not allowing the searchers to mark the items they were interested in and then print them out at one time. Another annoying drawback of Wilsondisc products was that the systems did not allow the users to view a listing of titles of the citations retrieved on one screen. While problems like lack of flexibility, short of date range, non-specific help screen were commonly shared by all product lines. Table 13 shows the users' reactions to the systems by product lines.

Table 13
System Problems by Product Lines

	SilverPlatter (90 users)		Wilsondisc (20 users)		UMI (45 users)		Other (45 users)	
	Total	%	Total	%	Total	%	Total	%
Slow response time	12	13	1	5	14	31	3	7
Lack of flexibility	21	23	3	15	8	18	11	24
Inadequate menu description	4	4	3	15	4	9	1	2
Need to switch disks	5	6						
Date range not long enough	14	16	5	25	10	22	11	24
Does not have abstracts	8	9	6	30	2	4	2	4
No listing of titles	9	10	2	10	1	2	1	2
Marking problem	6	7	4	20	6	13		
Error message not informative	4	4			1	2	1	2
Help screen not specific	13	14	3	15	6	13	3	7

The next thing the researcher questioned the users about was their search results. A little more than thirty-three percent (33.5%) of the respondents said they found more citations than they expected; 32% indicated that they retrieved about the number of citations they wanted, and 31.5% got fewer citations than they needed. Six or 6% of the graduate students and 6 (7%) of the undergraduates did not find any information on their topics. Evaluation of the data leaves the impression that the more experienced did not necessarily get better search results than the less experienced. In addition, there was no guarantee that users who developed their search strategies with Boolean logic or thesaurus yielded better search results. This was because users' needs varied. Some might need thorough searches that did not miss anything, and others might just want a few precise citations. The information provided by the databases, such as the time period covered, the journals/books included, also had an influence on users' search results. Tables 14, 15, and 16 present the relationship between users and their search results by user status, user prior experience, and search strategies applied respectively.

Table 14
Search Results by User Status

	Faculty		Graduate		Undergrad		Staff		Total	%
	Total	%	Total	%	Total	%	Total	%		
More than expected	1	25	27	26	39	43			67	33.5
About the number			38	37	25	27	1	100	64	32
Fewer than expected	3	75	34	33	26	29			63	31.5
No citation on topic			6	6	6	7			12	6

Table 15
Search Results by User Prior Experience

	0		1-5		6-10		11-15		15+		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
More than expected	9	36	24	36	10	29	8	47	16	29	67
About the number expected	9	36	21	31	14	40	5	30	15	27	64
Fewer than expected	5	20	17	25	13	37	2	12	26	46	63
No citation on topic	2	8	6	9					4	7	12

Table 16
Search Result by Search Strategy Employed

	NO		S1		S2		S3		S4		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
More than expected	8	31	48	34	9	36	11	37	6	43	83
About the number expected	10	38	44	31	8	32	11	37	4	29	76
Fewer than expected	6	23	45	32	7	28	6	20	5	36	69
No citation on topic	2	8	5	4	1	4	5	17	1	7	14

Note: No : No strategy employed
S1 : Think about key words in head
S2 : Put all the possible search terms on paper
S3 : Look up Thesaurus on CD-ROM
S4 : Use Boolean logic to formulate search statements

Question 10 correlated with question 8. It offered users an opportunity to rank the three most important ways they would improve the database they were using. A list of possible methods and an "Other" option in which to specify one of their choices was given. The results of that tally are arranged by user status, product line and individual database in Tables 17, 18, and 19. Generally speaking, making the system accessible from offices and homes was the first choice of 2 of the faculty (50%), 33 graduate students (32%), and 50 (25%) of the total population surveyed; while including more journals/books was the first concern of 22 (24%) undergraduates and the second priority of faculty members and graduate students. When adding up the numbers of priorities 1, 2 and 3 together for each option, we could see the rank of product improvement priority is:

1. "Include more journals/books" 53%
2. "Make it accessible from offices and homes" 52.5%
3. "Expand the range of years covered" 43%
4. "Make the Help Screen be more specific" 29%
5. "Make the information covered more current" 28.5%
6. "Provide abstracts" 21%
7. "Change the search procedures" and "Other" 17%
8. "Include fewer journals/books" 3%

Table 17 shows the priority order concerning the improvements to be made by user status.

Table 17
System Improvements by User Status

	Faculty	Graduate	Undergrad	Staff	Total	
Priority order	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	*Total
Make info. more current		11 6 8	11 12 8	1	22 19 16	57
Expand date range	1 1	17 16 11	11 16 12		29 33 23	85
More journals/books	1	14 25 18	22 18 8		36 44 26	106
Fewer journals/books		1	4 1		4 2	6
Provide abstracts		7 8 6	6 7 8		13 15 14	42
Change search procedures		7 5 3	3 3 13		10 8 16	34
Specific help screen		8 10 6	13 12 8	1	21 22 15	58
Accessible from home	2 1	33 13 15	15 9 17		50 22 33	105
Other	1 1	6 6 4	10 4 1	1	18 10 6	34

Note: * The number of times the improvement was selected by all the respondents.

According to the responses of question 8, we know each product line has its own problems. The researcher again divided the databases used into four groups based on the producers. The improvements the users would make for each product line is tabulated in Table 18. The three priorities selected by SilverPlatter products users were the same as those chosen by the total respondents. Wilsondisc products users ranked "include more journals/books," "provide abstracts," and "make it accessible from offices and home" as the three improvements they felt were most important. As for UMI products users, "include more journals/books" was the most important, "expand the range of years covered" was the

secondary concern, and the third thing to do to improve the index was "make it accessible from offices and homes." Users of other product lines checked the same items as UMI users did but ranked them in a different way. Table 19 demonstrates the priority of the improvements by individual database.

Table 18
System Improvements by Product Lines

	SilverPlatter (90 users)			Wilsondisc (20 users)			UMI (45 users)			Other (45 users)		
Priority order	1	2	3	1	2	3	1	2	3	1	2	3
Make info. more current	11	8	6		1	3	4	5	3	7	5	4
Expand date range	13	13	9	3	2	1	4	12	8	9	6	5
More journals/books	11	18	11	4	9	2	14	8	5	7	9	8
Fewer journals/books		2	1						1		2	
Provide abstracts	5	3	6	6	2	3	1	5	2	1	5	3
Change search procedures	5	3	7			1	5	3	4		2	4
Specific help screen	9	12	7	4	1	2	6	4	2	2	5	4
Accessible from home	28	11	12	2	3	5	8	3	11	13	4	5
Other	9	7	3	1	1	1	2	2	2	6		

Table 19
System Improvements by Individual Database

	PsycLit			Medline			Acad. Index			Bio. & Agri.			ABI/INFORM		
Priority order	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Make info. more current	3	4	2			1	4	2	3				1	4	3
Expand date range	3	4	7	1			7	5	3				1	7	2
More journals/books	4	5	6	1	2		5	7	4				9	2	3
Fewer journals/books		2						2							
Provide abstracts	1	1	1				1	5	3				1	3	1
Change search procedures	3	1	2					2	4			1	3	1	2
Specific Help screen	2	5	3				2	4	3	1		1	1	1	2
Accessible from home	13	2	4		1		10	1	5				6	2	5
Other	3	2		2			4			1	1		1	1	1

Table 19 continued

	MLA			ERIC			SSI			Sociofile			BPI		
Priority order	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Make info. more current		1	1	5	3	1				2	1	1			2
Expand date range	1			7	5	1		1		1	2			1	
More journals/books	1	4		4	5	3	1		1	1	4	1	2	3	
Few journals/books						1									
Provide abstracts	3	1	2	2	1	1	1			1	1	2	2		1
Change search procedures				2	2	4						1			
Specific Help screen	2			4	7	4		1		1					
Accessible from home		1	4	13	6	4				1	1	3	2	2	1
Other				2	5	3				2					1

Table 19 continued

	Art Index			Disser. Ab.			News. Ab.			Lib. Lit.			PAIS		
Priority order	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Make info more current							3	1					1		
Expand date range	1		1		1	4	3	4	2	1			1	2	
More journals/books		2		2	1		3	5	2			1	1	1	1
Fewer journals/books									1						
Provide abstracts					1			1	1		1				2
Change search procedures				1	1		1	1	2						
Specific Help screen	1		1	1			4	3					1		
Accessible form homes				1			1	1	6					1	1
Other					1		1		1						

Table 19 continued

	CaDiLaC			Disclosure			GPO			NTDB			SCI		
Priority order	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Make info. more current	1	2	1	2					1						
Expand date range		1	2						1				1		
More journals/books	1		1		1	1		1		1					1
Fewer journals/books															
Provide abstracts							1								
Change search procedures															
Specific Help screen						1	1								
Accessible from home	1	1			1			1						1	
Other	1			1											

Table 19 continued

	Population Statistics			County Bus. Pattern			Congression Masterfile			**Total			*Total
Priority order	1	2	3	1	2	3	1	2	3	1	2	3	
Make info. more current		1								22	19	16	57
Expand date range	1									29	33	23	85
More journals/books			1		1					36	44	26	106
Fewer journals/books											4	2	6
Provide abstracts										13	15	14	42
Change search procedures										10	8	16	34
Specific Help screen								1		21	22	15	58
Accessible form homes				1			1			50	22	33	105
Other										18	10	6	34

Note: ** The total number of times the improvement was selected for all databases for each priority 1, 2, 3.
* The number of times the improvement was selected by all respondents.

A variety of means regarding products improvements were specified in the "other" option. Among those the most commonly mentioned were: having more terminals available, indicating whether or not the Library has the journal/book indexed in the database, loading call numbers into the software, providing full text, and allowing more search time. The rest of the opinions are listed in Appendix A.

The last question on the survey was pertinent to CD-ROM instructional programs. The purpose of this question was to find out what the CD-ROM user want, thus the librarians would be able to try to offer the services that tailor to their needs. In general,

the most commonly recommended models of instruction were: "Computer-Assisted Instruction," (CAI) 89 users or 44.5%; "individual instruction on demand," 80 users or 40%; "written guides with sample search questions," 77 users or 38.5%, and "workshops to learn how to choose the right database, select the search terms, use Boolean logic, formulate search strategies, etc.," 72 users or 36%. Only 13 users (6.5%) thought "no formal instruction is needed." If we break down the data by user status, we can see that "CAI" was the most strongly desired program by both graduate students and undergraduates. Individual instruction on demand was preferred by faculty and undergraduates while workshops concentrating on searching techniques were favored by graduate students. The model that was highly valued by all groups of users was "written guides with sample search questions." Table 20 summarizes the findings.

Table 20
Recommended Instruction Programs by User Status

	Faculty	Graduate	Undergrad	Staff	Total	%
	Total %	Total %	Total %	Total %		
Computer assisted instruction)	2 50	41 39	46 51		89	44.5
Individual instruction	3 75	34 33	43 47		80	40
Subject related instruction		29 28	25 27		54	27
Guide & sample questions	2 50	38 37	36 40	1 100	77	38.5
Scheduled Training sessions	1 25	35 34	27 30		63	31.5
Workshop(for searching skills)		39 38	33 36		72	36
No instruction is needed		8 8	5 5		13	6.5

The reader might wonder if the instructional program needed by the novice and the less experienced user differs from the model demanded by the more experienced searcher. According to the results, "CAI" and "individual instruction on demand" were popular with all users, no matter how much prior experience they had. Compared with the novice and the less experienced user, patrons with more CD-ROM search experience showed more interest in "written guides with sample search questions" and workshops emphasizing search skills. Table 21 reveals the different needs by users with different levels of CD-ROM experience. Other suggestions mentioned by the patrons were: handouts near terminals, assignment geared for specific results, more terminals always with CDs in them so people can teach themselves, teachers informing students of the systems, and classes for different people at different levels in computer knowledge.

Table 21
Recommended Instruction Programs by User Prior Experience

	0		1-5		6-10		11-15		15+		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
Computer-assisted Instruction	14	56	30	45	14	40	7	41	24	43	89
Individual instruction	11	44	24	36	16	46	6	35	23	41	80
Subject related instruction	6	24	18	27	10	29	6	35	14	25	54
Guide & sample questions	9	36	25	37	13	37	7	41	23	41	77
Scheduled training sessions	6	24	27	40	14	40	4	24	12	21	63
Workshop (for searching skills)	6	24	26	39	14	40	4	24	22	39	72
No instruction is needed	2	8	5	7	3	9	1	6	2	4	13

An open-ended question was at the end of the survey for participants to offer comments and suggestions. Comments such as these were common: "easy to use," "very helpful," "The system is great." Quite a few commented on the need for more workstations, and several suggested making the system accessible from remote computers or through Internet. Some complaints about hardware problems were made, and the need for more advertising and training were recommended. Representative examples include the following:

The system is very helpful.

The product is easy to use.

The system is great.

More information about how to retrieve a file of downloaded CD-ROM citations utilizing the users' computers is desired.

Divide the CD-ROM area into two areas, one for experienced users and the other for the inexperienced.

The system is flexible but more time is needed.

It is very self-explanatory.

Have viewing screens that do not strain the eyes.

Hard to find exactly what I need. Have to search through many files.

More terminals are needed.

Provide CD-ROM search instruction in the evening hours and announce the schedule on GEMINI.

Extremely time saving.

"A Day at the Library" training would be great.

Database is adequate, but supply of journals/books in the Library is very limited.

I like searching by myself. I also like having a librarian available to help me when

I have problems.

Please make it accessible from home.

A workshop is a great idea.

CD-ROMs are much better than the equivalent printed indexes.

Should be advertised more.

It would make it easier if the user could know whether or not the library has the journals.

Make it accessible via Internet.

I feel that it could be helpful if students were aware of the search program for research assignments in their classes.

Use of CD-ROM is much easier than I expected.

Librarians were more helpful than on-line instructions, especially when students are pressed for time.

Have problems of printing out citations.

IMPLICATIONS OF THE PROJECT

The results of the project indicate that patrons made little use of the workshops that were provided, and they tended not to use the database search guides available at the workstation but rather requested assistance from the librarian. Seeing that the former is good for the basics, and the latter is a desirable self-help tool, ways of encouraging better attendance at the instruction workshops should be found. An easy and inexpensive improvement would be to move the display rack of the database search guides to a more obvious location, so that the patrons would see it immediately and utilize it before starting

their searches.

As to the search strategy employed by the users, graduate students were inclined to make better preparation for their searches than undergraduate students did. Nevertheless, only a little portion of the patrons used Boolean logic to formulate their search statements. This is probably because they did not understand the concepts of Boolean searching. Although the precision of search results can be enhanced through the use of the thesaurus, index terms available on-line, and the selection of specific terminology, the majority of the users failed to do so. Therefore, ways to cultivate users' habits of looking up the documentation, as well as develop their concepts of Boolean logic, should be reinforced when offering guidance.

The researcher did not expect that the most experienced or patrons employing more advanced search strategy, such as Boolean logic, would not get better search results. Many of them got fewer citations than they expected. This interesting finding can be attributed to several possibilities. First, even though many users reported using logic operators, they may have used natural language instead of indexed terms and thesaurus entries. This could have led to false drops. Second, they may have selected search terms which were not specific enough, and attempted to perform searches which were not well refined. Third, they may have tried to locate information which was outside of the scope of the CD-ROM application. And finally, it is uncertain as to whether or not the capability and the limitation of the system was fully comprehended. All of these imply that if the patrons gain a better understanding of the nature of the databases they use, then properly conducted searches will yield more precise results.

Several factors influenced the users' searches; hardware was one of them. The most common complaint about hardware was the printer, so maintenance and providing better quality of printers should be seriously considered. Throughout the duration of the survey, the researcher observed that even if there were signs to inform the patrons of the databases available on network and stand-alone workstations, many users did not notice their existence. It is likely that the signs were too small to catch users' attention. This made some of the patrons unable to determine which dedicated workstation to choose. Besides, these signs listed only the CDs' titles under subject areas without any scope notes. This did not reduce the difficulty for inexperienced patrons to select the right databases they needed. Users cannot make critical choices about information sources until the nature of indexes is understood. Therefore, it is necessary to design informative signs and set them in an obvious place. To serve their purpose, signs might include the title of the CD-ROM product and a brief description of its information universe. Since over 20% of the respondents did not know how to retrieve relevant information more effectively by using Boolean logic and the thesaurus, the librarians can consider providing training in developing search strategies, so that both the ability of patrons to use the CD-ROM equipment and to perform their searches can be improved. Training programs that are geared toward problems that users may encounter in the course of searching can benefit users, especially novices.

The CD-ROM producers always claim that they put forth a great effort in making the system easy to use. Nevertheless, the results of the survey show that sometimes the patron's frustration was caused by the lack of instructions in various user interfaces. Each product has its own on-line help, but very often it could not adjust to various situation that

users confronted. When an improper command was detected, very likely, the error message failed to explain what the error was and prompt the users for missing parameters. For some systems, especially UMI products, the more sophisticated the strategy, the longer the search takes. Other common product problems identified are lack of flexibility, slow responses time, short date range and lack of specific Help Screen. Recognition of these problems should be valuable to CD-ROM producers in developing and enhancing their search interfaces. Before these drawbacks are improved, the librarian might keep users from getting stuck by creating a template, instructing users how to get started, how to get help, how to select options from the menu, what the function keys mean, how to look up the on-line index or thesaurus, how to truncate, how to print the citations found, and exit from the system. Other measures that the product producers and the librarian can take to meet user satisfaction are indexing more journals/books, expanding the range of years covered, providing abstracts, furnishing more terminals, indicating the library holdings and loading the call numbers of the titles owned by the library into the software. Another crucial suggestion for enhancement of the service is allowing the systems to be accessed from remote computers or through other avenues. This provides the users with the convenience of doing searching at home or in their offices. It will also free the workstations a little bit and help decrease the chance of patrons waiting to use the terminals. Additionally, this implementation will help reduce the librarians' workload, so higher quality of services can be offered.

CD-ROM technology has been accepted enthusiastically by the users, but because of their unfamiliarity with the structure of databases and searching tricks, the users were not

able at times to retrieve the reasonable amount of information they needed. The instructional programs suggested by the respondents to help them perform a successful search were CAI, individual instruction on demand, written guides with sample search questions and workshops focusing on the conceptual side of the search, such as choosing the proper database, selecting appropriate search terms, using Boolean operators, formulating search statements, etc. CAI was the first priority of the majority of users because it can offer an interactive means of learning and patrons can get feedback during the learning process. Since people who had attended workshops, consulted handouts, looked up the thesaurus, and had much CD-ROM experience still relied heavily on the assistance of the librarian, there is no doubt that individual instruction on demand was strongly desired. And it is clear that the CD-ROM librarian who is available for immediate, problem-specific assistance is indispensable. Yet, considering the fact that the library does not have enough human resources to offer scheduled, one-on-one instruction, the alternative way might be to have an adequate number of end-user searching assistants available at the CD-ROM help desk to provide assistance for patrons. The source of assistants can be graduate students, from the School of Information Science and Policy, who completed the online database searching class or have online bibliographic search experience. One way of making the current database guide more beneficial is to add a couple of sample search questions to it. This would create the opportunity for the users to put the concepts they have gained into practice. And practice makes perfect. A CD-ROM user might conduct a good search without using truncation and other search skills; while without an understanding of thesaurus use and Boolean search methodology, he/she is not able to use the system more efficiently

and perform his/her searches more effectively; without a full comprehension of the nature of the database, he/she cannot make critical choices about information sources. That might be the reason why a workshop pertinent to developing users' search abilities was highly valued.

CONCLUSION

CD-ROM technology has changed the way information is accessed and distributed. It is important for reference librarians to keep abreast of changes in database content and the system software. In the mean time, the librarian needs to prepare well-planned instructional programs for teaching end-users to sufficiently utilize the powerful system and obtain satisfactory search results. It is true that a user survey can never tell the whole story of patrons' reactions to the CD-ROM database service. Still, the responses and comments received from the users provided valuable ideas about what they really want and need. Their opinions enabled the researcher to address some problems that users encountered, too. By revealing the results to the reference department, it is hoped that the librarians would benefit from this survey by making the suggested improvements. In addition, the librarian might serve as the intermediary to pass along the complaints of the patrons surveyed to the CD-ROM producers, so that enhancement can be made when new versions of the products are developed.

CD-ROM databases have become an essential, time-saving tool for research in academic and research libraries, still there are gaps to be filled in order to meet user satisfaction. Making the products truly user-friendly and competitive with online database

search systems, which provide rapid, timely, and cost-effective service, is the major priority for the CD-ROM designers to master. And only when the producers, the librarians and the patrons cooperate with one another, can the CD-ROM database service be fine tuned to the needs of the end-users.

APPENDIX A

Subscribing MEDLINE EXPRESS instead of MEDLINE.

Provide a way to skip long lists of references.

Make more specific index terms.

Index more newspaper.

Make it easy to switch among search modes.

Better printers are needed.

Expand the information stored.

Have information sheets that give examples of what the computer can do, so we can choose what we need.

A notebook describing F1-F10 for each specialized disk near the terminals would help.

Provide a method to exclude non-English articles.

Stock more medical journals in the library.

Include more journals that this library has.

Expand search procedures.

Index only journals/books that are available locally.

List found titles at once on separate menu instead of a number.

Explain what was being seen.

Have a librarian whose job is to specially aid those using computers.

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