

Research Notes

Library of Congress Staff Test Optical Disk System

Victoria Ann Reich and Melissa Ann Betcher

The Library of Congress has four optical disk reader stations that allow patrons to view and print document images at a resolution of 150 by 300 lines per inch. This phase of the evaluation project involved the staff during the implementation of this technology. It measured satisfaction with training, documentation, equipment, and printing; system reliability; and materials to be scanned. Staff found no major flaws with the system and saw its usefulness primarily as an access tool. Some problems were experienced viewing nontextual materials, and care in choosing materials for inclusion onto the system is recommended.

BACKGROUND

The future provides many challenges to the library and business worlds. In a society that generates masses of paper and demands quick and easy access to information, new options must be realized. Optical disk technology is one method being explored by a variety of institutions. The promises held out by optical disk technology are just now being realized: the ability to store large quantities of information in a compact space, the nearly instantaneous retrieval and display of information, the prospects for telecommunication, and the preservation of the original

item when desired by diminishing the need for physical handling. For the library world, the Library of Congress' Optical Disk Print Pilot Program is on the leading edge of experimentation with this new technology. The pilot program, begun in late 1982, is a four-year program designed to assess the applicability of digital optical disk technology to library services and preservation. The Library of Congress embarked on this project as a means of preserving and providing rapid access to a variety of collections of high-use and rare and previously unavailable materials.

Much of the library's equipment and software has been specially prepared under contract to Sony Corporation of America and to a California firm called Integrated Automation. Two systems are in use: a videodisc system using off-the-shelf Sony videodisc equipment and an optical digital disk system using twelve-inch disks, with a target capacity of ten thousand to fifteen thousand pages per side of a disk. In the digital system, approximately eight million bits are scanned and captured to represent one page. Selected journal article cited in BIBL, one of the library's online bibliographic files, are available on the optical disk system. Pa-

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trons may search the BIBL file by author, title, or subject. When the citations from a particular search are displayed, those having the text available online are noted. If the text is available, the reader can then call up images of the document on a black-and-white high resolution screen. The resolution is 150 by 300 lines per inch, displaying each image with approximately 4.7 million bits which, by using an "ordered dithering" process, approximates grey scale.

Reader stations for the digital system are located in four of the library's reading rooms: Law, Main, Newspaper and Current Periodical, and Science. A fifth station is in the Congressional Research Service (CRS). Users have the option of reading the document on the terminal or printing it. The Newspaper and Current Periodical reading room has a Xerox 2700 laser "convenience" printer, permitting the printing of the displayed page. Patrons in all stations can command a laser printer Xerox 5700 centrally located in the computer center. The resolution of the two printers is identical, and printer resolution exceeds that of the terminal since it prints three hundred lines per inch both vertically and horizontally.

The videodisc systems are not connected to the library's online systems but instead are "stand alone." These systems are available in the Prints and Photographs Reading Room and the Motion Picture, Broadcasting, and Recorded Sound Reading Room. The video images are essentially television images with the same low resolution as broadcast television. Consequently, they are not suitable for printed text but are satisfactory for photographs. They are in color and in black-and-white, and the user can either photograph the screen or print out a black-and-white image if a copy is needed.

OBJECTIVES

A significant portion of the pilot program will be the evaluation process. For the digital system, data transaction tapes containing data captured at each terminal session will be analyzed, and interviews will be conducted with patrons. The first phase of the evaluation process is a test of

the system using reference staff who will be assisting patrons when the system is released to the public.

The goals of the staff evaluation phase are to involve a wide representation of Library of Congress personnel during the implementation of this new technology and to collect data on the following: satisfaction with training, documentation, equipment, printing, and system reliability; materials to be scanned; and general satisfaction.

METHODOLOGY

In order to meet these objectives, staff opinions on the system were solicited through both voluntary and formal methods. Following installation of the optical disk terminals in late March 1985, each staff member received approximately a half hour of individual training. At that time logs were placed near the terminals, and a message center phone was instituted. During March and April, informal opinions of the staff were collected as they began to use the system. When staff members signed onto the system, they were asked to note the time and date on the log as well as any impressions of the system.

In May, the staff participated in a more formal evaluation of the system by completing three questionnaires. The questionnaires, entitled "Training and Documentation," "Equipment and Software," and "Printing," were designed to address the objectives of the pilot program. Each questionnaire included a log. People were asked each time they accessed the optical disk system to note the system's status. The questionnaires were pretested, revised, and distributed to all professional staff from the Science and Newspaper and Current Periodical reading rooms. All staff from the Main Reading Room, Telephone/Correspondence/Bibliography, and Automation and Reference Collection Sections of the General Reading Rooms Division were also queried. Staff in the CRS participated voluntarily. System trainers in the reading rooms distributed and collected the surveys. Respondents' identities were anonymous to the evaluation team. The distribution and return rates for the questionnaires are given in ta-

TABLE 1
QUESTIONNAIRE DISTRIBUTION AND RETURN RATES

Department	Distributed	Training & Documenta-		Equipment & Software		Printing	
	(Each Survey)	Returned	% Returned	Returned	% Returned	Returned	% Returned
Main Reading Room	25	25	100%	25	100%	24	96%
Science Reading Room	20	18	90%	18	90%	18	90%
Newspaper and Current Periodical Reading Room	17	17	100%	17	100%	17	100%
Total	62	60	97%	60	97%	59	95%
Congressional Research Service*	20	9	45%	6	30%	4	20%

*Staff in CRS participated voluntarily. Consequently, the totals for this table are given separately, and CRS results are not included in other tabulations.

ble 1. As a follow-up, interview sessions were held to allow staff to express their views directly to the evaluation team. Interview participation was voluntary, with 18 percent attending.

RESULTS

All of the questionnaires and test prints were analyzed by the authors. Many answers gave new insight into perceived and actual drawbacks to the optical disk system itself or to its current environment and in the library. Ninety-two percent of the staff was pleased with their optical disk training. Of those desiring more instruction, there was an even split between those interested in specific optical disk manipulation and those needed assistance in using the retrieval software. A half hour of individual training appears to be the minimum time needed to integrate a new system into the work flow. More than half of the respondents felt that the public's previous knowledge of Library of Congress databases would affect how successfully they could conduct a search on the optical disk system. When comparing the manual and the online instructions, eight out of fifteen respondents who volunteered comments said that a hard copy version is more useful, particularly for the naive user.

At this point there has been no experience reading text from the screen for long periods of time. Sixty percent of the respondents have only read text from the screen for one to five minutes, with another 32 percent reading from for six to fifteen minutes (see table 2). However, when asked how long they felt it would be

possible to read comfortably from the screen a wide range of answers was received. A small percentage appeared at each end of the range (15 percent for one to five minutes and 13 percent for more than sixty minutes), with a more even spread in the middle range (34 percent for six to fifteen minutes and 30 percent for sixteen to thirty minutes). However, with 79 percent of respondents believing that thirty minutes is the maximum amount one can comfortably read from the screen, it becomes apparent that the librarians perceive the optical disk primarily as an access tool.

Of those people citing problems while reading from the screen, 57 percent encountered difficulties with text, and 56 percent had trouble with graphic images. Four people complained of lines through

TABLE 2
READING TEXT FROM THE SCREEN

Time Period (Min.)	Longest Time Actually Used*	Longest Time Possible to Use†
N	48	47
1-5	60%	15%
6-15	32%	34%
16-30	8%	30%
31-60	0	8%
More than 60	0	13%

*What is the longest approximate time you have read text from the screen?

†How long do you think you would be able to read text comfortably from the screen?

the text, and three stated there was a loss of print or black sections on the screen (table 3). Another four staff members suggested that the screen be tiltable in order

TABLE 3
PROBLEMS READING FROM THE SCREEN

	Text*		Graphicst	
	No	%	No	%
Respondents citing no problems	20	43	20	44
Respondents citing one or more problems	26	57	25	56
Total	46	100	45	100
<i>Problems Cited</i> ‡	26		25	
Screen flickers		38		16
Surface glare		46		32
Blurry image		27		28
Images too bright		23		—
Images too dim		4		—
Unable to read small print		35		—
Fine detail missing		—		44
Need color to interpret display		—		24
Halftones indistinct		—		40
Other		42		8

*Have you encountered problems while trying to read text from the image screen?

†Have you encountered problems while looking at graphic or picture images?

‡Respondents saying they had difficulties were asked to check all appropriate items.

to eliminate some of the difficulties in reading. A tilting screen might have assisted those respondents who felt that the angle and glare on the screen contributed to the difficulties in reading small print. Glare was cited as the primary difficulty by 46 percent of those responding that they experienced problems. Staff had difficulties with viewing color images, with 40 percent of those answering stating that the half-tones were insufficient to represent the colors, thus making interpretation difficult. Print size and the lack of a zoom feature caused difficulties with both text and pictorial materials, with 35 percent saying they were unable to read fine print and 44 percent saying fine detail was missing in pictures or graphs.

Similar comments were received on questions dealing with print resolution (see table 4). Although 68 percent were satisfied with the overall quality of the printed copy, 42 percent still felt that fine details were illegible. Those items that tended to be illegible included bar graphs, some photographs, characters on multi-color images, and fine details such as cursive writing on old documents. As a means of testing printer reliability, "test" printers of a specified article were ordered by respondents and sent to the evaluation team. Twenty-nine prints were received, and their clarity, darkness, and legibility were identical. The print resolution was equal to or better than the screen resolu-

tion. It should be noted, however, that the article was straight text. In another part of the evaluation, staff were asked to send the evaluation team an offline print of their choosing. Twenty-seven were received. Staff cited several problems with the clarity and resolution of these images, although printer and screen resolution were supposedly identical. The evaluation team compared the prints with the images on the screen and discovered that print and screen images were indeed identical and that those items identified as being illegible in the print were also hard to discern on the screen. Variations noted in copy contrast could be attributed to the mechanics of the photocopy machines.

Staff members in the Newspaper and Current Periodical Reading Room were also asked to comment on the convenience printer. Percentages on overall quality and fine detail legibility were comparable for convenience printing and offline printing. Staff often stated a preference for one type of print over the other. Impressions about which copy was of better quality varied. Since the printers are identical, except for speed, these comments raised new questions for the researchers. The evaluation team tested this by printing five articles offline and, at the same time, doing a convenience copy. A comparison revealed that print resolution was identical. However, those items printed offline have a darker copy con-

TABLE 4
PRINTER RESOLUTION

	Offline		Convenience	
	No	%	No	%
<i>Satisfied with overall quality*</i>	35		13	
Yes	24	69	9	69
No	11	31	4	31
<i>Reasons for dissatisfaction†</i>	11		4	
Text blurred		27		75
Black lines		45		25
Too dark		18		0
Too light		9		25
Too chopped off		45		0
Bottom chopped off		18		0
Poor contrast		73		0
Other		18		0
<i>Fine details legible‡</i>	36		12	
Yes		53		58
No		42		42
Not applicable		5		0
<i>Copies legible§</i>			13	
Yes				92
No				8
<i>Comparison with screen image </i>			11	
More legible				18
Less legible				18
Same				64

* Are you satisfied with the overall quality of the image?

† Respondents saying they were dissatisfied were asked to check all appropriate items.

‡ To the best of your knowledge, are the fine details legible?

§ In your experience are the copies made by the convenience printer legible?

|| How does the printout compare to the image on the screen?

trast, making some details more legible and others less so than the convenience copies. This could explain staff perceptions of a difference in the quality of prints.

DISCUSSION

An essential part of the evaluation was to test the system's reliability, an aspect attempted through the logs located by the terminals and those in the questionnaires. Logs from March and April indicate that half of the recorded attempts to access the system were successful. Figure 1 shows the data recorded in May as people approached the system to complete their questionnaires. This data includes information from the Congressional Research Service not included elsewhere. During the twenty days of testing in May, 111 attempts were made to access the system. These data are hard to substantiate since the system is a series of complicated components interrelated with other library equipment and software. If any one com-

ponent is not available, the patron cannot access the optical disk system and can only guess which component is not available. Use of both the terminal and the questionnaire logs was sporadic, and any findings are inconclusive. Scheduled stress tests and data from the questionnaire logs indicate that the system works well when multiple users (up to five, the current maximum) are signed on. Engineers in the Automated Systems Office, responsible for system maintenance, estimate that the system's availability is comparable to that of other online systems.

A further part of the pilot project is to help the library determine how to use the optical disk technology optimally. Staff felt that the optical disk was not suited for high-use current periodicals unless many more terminals were installed (twenty in the Newspaper and Current Periodical Reading Room, for example). One alternative was to scan specialized high-use items such as the *Physicians Desk Reference* and other items that are hard to control, such

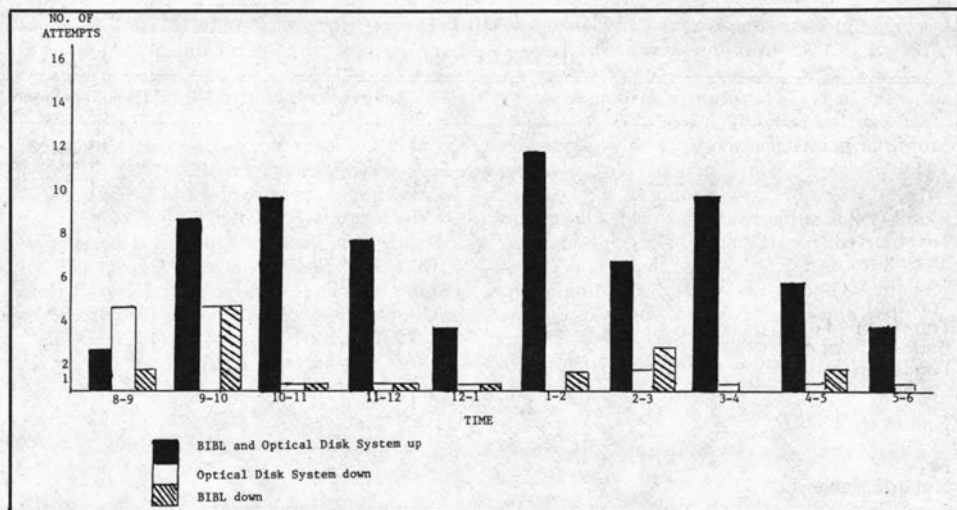


FIGURE 1
System Reliability—May (Total Number of Attempts = 111)

as the *Congressional Record*.

Staff did not uncover any major flaws in the technology, and their feedback gave the library useful information on how to change the environment to enhance use of the technology. A large percentage of people experienced problems viewing documents on the screen. The causes of these difficulties are often unclear, although difficulties usually concerned graphic or pictorial materials, not straight text. Some of these problems may be alleviated by altering the work station, as by installing tilt-able screens. Further, staff offered many specific suggestions for improving the printed and online documentation.

Until the technology can affordably provide color or enlargement of details on the screen, the library may wish to use discretion in choosing color or small print materials for scanning. The problems experienced with printer quality may also be alleviated somewhat by judicious choice

of materials to be scanned. Current procedures require that users of the remote print facility receive printouts the next day. The impact of this limitation will be strongly affected by the materials chosen for inclusion on the disk—for example, are copies available more quickly elsewhere in the library? The staff's opinions about good candidates for inclusion were materials that are hard to obtain elsewhere in the library. This would include specialized and hard to control items (mentioned previously) as well as items locked up for their own protection (such as the comic book collection and the pulp fiction collection), pamphlets, association newsletters, and foreign language technical materials, among others. Staff members look forward to the time, not too far from now, when Library of Congress patrons can sit at a terminal and search and access the library's resources easily.

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The Effect of Service Awareness on Survey Response

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The authors had examined the relative effect of university or library sponsorship in a 1984 survey of computer utilization of Wharton School M.B.A.'s and faculty. In the intervening year, many new services have been offered to the M.B.A.'s. The survey was redistributed. The response rate to the library was significantly higher for students who had used the new services than for those who had not. This result suggests that the interaction of sponsorship and the respondent group, not sponsorship itself, is the critical variable. A possible sex bias between the male professor and female librarian was found not to be significant.

In 1984 the authors conducted a survey of students and faculty of the Wharton School to determine the extent to which personal computers were used for online searching. In developing the survey, sponsorship became an issue. Previous re-

search on sponsorship suggested that if there is a perceived prestige difference between sponsoring groups, there may be a significant difference in the response rates. In general, the more prestigious sponsor elicits the higher response rate.

Sponsorship as a factor affecting questionnaire return rate has been examined in numerous studies in the literature. Doob and Peterson both found that university sponsorship increased response rate over business firm sponsorship by 10 and 13 percent, respectively.^{1,2} Peterson suggested that sponsorship was the dominant factor influencing returns.³ Jones and Linda also found that university sponsorship significantly increased response rates.⁴ Several other studies are cited by W. Jack Duncan in his review article.⁵ Further, Jones, based on previous studies by Scott and by Sudman and Ferber, sug-

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