School of Information Sciences -- Faculty Publications and Other Works

School of Information Sciences

2-1992

Databases Online and on CD-ROM: How Do They Differ, Let Us Count the Ways.

Diane Nahl-Jakobovits

Carol Tenopir
University of Tennessee - Knoxville

Follow this and additional works at: https://trace.tennessee.edu/utk_infosciepubs

Part of the Library and Information Science Commons

Recommended Citation
Diane Nahl-Jakobovits and Carol Tenopir. "Databases Online and on CD-ROM: How Do They Differ, Let Us Count the Ways." Database 15 (February 1992): 42-50.

Databases online and on CD-ROM: how do they differ, let us count the ways

Authors: Diane Nahl-Jakobovits and Carol Tenopir

Full Text:
DATABASES ONLINE AND ON CD-ROM: HOW DO THEY DIFFER, LET US COUNT THE WAYS

Editor's Note: The decline in online searching following the introduction of CD-ROM products seems to be a distinct trend in academic settings. However, some corporate librarians have reported to us that CD-ROM searching by end-users has actually stimulated end-user requests for mediated online searching, by raising the level of awareness of information resources and raising the profile of the library in the corporate setting. Corporate librarians still need to make choices about media and users' needs, and should find this article informative and useful reading.--PH

With many databases now available in both online and CD-ROM formats, librarians face a new kind of decision-making. Academic librarians in particular need to decide which medium best meets their users' needs and fits the library's budget and service goals, because it may not be feasible to pay for the same database in both formats or even to maintain the two electronic services.

Installing CD-ROM databases for end-user searching often leads to significant declines in online database searching [1]. At Texas A&M, for example, "usage of the online equivalents of the databases [we have on CD-ROM] began to decline only two or three months after the CD-ROM versions became available" [2]. Online mediated searches at the University of Hawaii library's Humanities/ Social Sciences Department went from an average of 56 per month to only 11 per month after heavy investment in CD-ROM sources. Kent State reports a 30 percent drop in online mediated searches, while Vanderbilt reports a 58 percent decline over two years [3].

As librarians spend far less time searching online systems they may experience a decline in their online search skills, while experiencing an increase in their CD-ROM search skills. It may not be feasible (or desirable) to maintain both sets of skills at a high level. Many academic librarians seem to be making the choice to concentrate on CD-ROM, the service that impacts the largest number of users and that returns literature searching to the patron. The assumption is that if a database is made available on CD-ROM the library is getting exactly the same information it used to get online. This may not always be the case[4].

COMPARISON FACTORS

There are several factors to consider when selecting a CD-ROM database that will likely be used in place of searching the database online. Clark mentions time period covered, content, response time, updating frequency, retrieval capabilities, indexed fields, number of keystrokes required per search, and output options [5]. We decided to investigate the factors of response time, coverage, content, and cost in two popular databases that are available online and on CD-ROM. We compared SilverPlatter CD-ROM versions of Psychological Abstracts and Sociological Abstracts with online versions available on DIALOG.

We expected to find differences much as an earlier comparison of online and CD-ROM versions of PAIS by Kluegel and Loehr did [6]. They found differences in search results for a variety of reasons, including differences in search software, an online processing error, and variations in subject headings. The Executive Director of PAIS responded that the versions of the PAIS database are, however, exactly the same on CD-ROM and online[7].

PSYCHOLOGICAL ABSTRACTS

Psychological Abstracts has two electronic versions, PsycINFO, online via several systems including DIALOG, and PsycLIT on SilverPlatter CD-ROM. The two versions do not claim to be exactly equal. PsycINFO on DIALOG (File 11) includes journal articles, technical reports, dissertations, and non-English language sources. It is updated monthly and covers the period 1967-present. PsycLIT on CD-ROM from SilverPlatter is a sub-set of the PsycINFO database [8]. PsycLIT does not include dissertations or technical reports, is updated quarterly and covers the period 1974-present on two disks. The record structure and search capabilities of the two systems are similar, however.

We searched SilverPlatter's PsycLIT on a Local Area Network in the public service area of the Humanities and Social Sciences Reference section of the University of Hawaii Hamilton Library. The LAN has seven IBM PS2 Model 50 computers with two 30MB hard drives, 1MB RAM, and 12" color VGA monitors with eleven CD-ROM databases loaded into a MultiPlatter jukebox.(*) SilverPlatter put PsycLIT on two separate disks: a current file that is updated, and a backfile. For the purposes of this study, the backfile was not searched. DIALOG's File 11 was accessed with a 1200 baud modem using Versaterm communications software.

The annual subscription cost for SilverPlatter's PsycLIT database is $5,095 for a multiuser system with a concurrent subscription to Psychological Abstracts, and $5,995 without a PA subscription. Single user subscriptions (used on a standalone workstation) are $3,995 without a subscription to the print and $3,395 with a concurrent subscription. SilverPlatter offers 25% discounts for multiple subscriptions to the same CD-ROM title. DIALOG's PsycINFO costs $55 per hour plus network charges and online or offline type charges. Discounts on connect time are available on a subscription plan with a commitment to searching a minimum of $3,000 per year.

Methodology

A series of questions were searched on each system to compare the Psychological Abstracts database on DIALOG (PsycINFO) with the SilverPlatter CD-ROM (PsycLIT) version. Six search topics were selected from the Search PsycINFO Instructor Guide, which provides equivalent search statements for each topic for five systems, including DIALOG and SilverPlatter. The search statements given for DIALOG's PsycINFO and SilverPlatter's PsycLIT for each of the six strategies in the study were entered verbatim into each system. Appendix A lists the topics and search strategies. The strategies use several search capabilities available in both systems, including: field searching, Boolean operators, free-text searching, and proximity operators.

All searches on DIALOG were limited to the publication years 1983:1990 to correspond to the current PsycLIT disk. This was also done to approximate actual use of the CD-ROM version, assuming that people search the most recent disk more frequently. The time figures for the DIALOG searches are thus slower than they would be without the date limitation, since it takes an extra amount of time to limit by date in DIALOG, about 12 seconds on the average.

Each search was timed with a stopwatch from the first keystroke of the statement, through the Type command, to the end of the display of the first record in the set. Since response time varies online, time of day was controlled by searching DIALOG on two different weekdays at two different times, early afternoon and early evening Pacific time. SilverPlatter was also searched on two different days and times.

The entire sets were printed in full format in both systems. Retrievals were analyzed to determine unique records in each database and reasons for uniqueness.

Strategies

The retrieval results in Table 1 show that the suggested strategies are indeed equivalent, but there are differences in the exact strategies and time required to input each. Search A ("seasonal affective disorder"), search D ("Type A behavior"), and search E ("empty nest syndrome") employed proximity operators to bind the phrase in DIALOG. In SilverPlatter word proximity is the default search mode. Proximity is defined by a space between words with no operators necessary. The field limit command convention in SilverPlatter requires typing the field limit separately for each term, thus the terms must be typed twice to limit the search to the TI (Title) and KP (Key Phrase) fields. These fields correspond to the Title and Identifier fields in DIALOG. The alternative method we used is to create a main set from all fields (#4 seasonal affective disorder), then limit that set number by each specific field, ORing the field limited sets (#4 in ti or #4 in de or #4 in kp). In DIALOG this is equivalent to: ss seasonal()affective ()disorder/ti,de,id. Thus, there are more keystrokes in a SilverPlatter search statement when limiting the same term to more than one field.

Search B on "resistance to psychotherapy" is limited to the Descriptor field in both systems, as is search F on "stress in industrial workers." These require nearly the same number of keystrokes. The descriptor and key phrase fields in SilverPlatter are hyphenated fields. The hyphens bind words into descriptor or identifier phrases. If the descriptor field is searched without hyphenating, the phrase is still bound, but it may also be searched as part of a longer descriptor phrase.

Search C on "death attitudes in healthy children" is a Descriptor search with a NOT operator to eliminate the Psychological Abstracts classification codes 32 (Physical and Psychological Disorders) and 33 (Treatment and Prevention), since the target is healthy children.

Retrievals

Table 1 shows the results for: mean number of retrievals per search (Hits); mean number of unique documents per search (Uniques); and mean response time (Time). As expected, DIALOG's PsycINFO retrieved a significantly higher number of documents; five more per search on average. Five percent of the CD-ROM retrievals were determined to be unique to the PsycLIT database, compared to 17% on DIALOG. This three-fold difference confirms our supposition that there would be more retrievals online.

Response times are not significantly different. A more important picture emerges when one looks at the standard deviations (SD). PsycINFO has a significantly smaller SD than the CD-ROM database. The average response time for PsycINFO is 1'34", but the SD is very small (15"). This indicates consistency in performance and acceptable search times. In search D, 7'30" on CD-ROM is not an acceptable response time. For PsycLIT the average is 1'49", but the SD is 2'48". This indicates high variability per search.

The typical search on CD-ROM is under 46 seconds, compared to 1'34" online. This is offset by the fact that two of the six searches (33%) had considerably longer response times, (one over seven minutes). Therefore one can expect one-third of the CD-ROM searches to be unacceptably long, lasting several minutes. CD-ROM searches are thus bi-modal in pattern: about two-thirds are very

quick and one-third are extremely slow.

The slowest CD-ROM searches (Searches A, D and E) are free-text searches limited to particular fields. Certain highly posted terms (for example, the letter "A" in "Type A Behavior") result in lengthy processing time. SilverPlatter took an extraordinary amount of time to process the letter "A" in "Type A behavior." This type of search reveals a weakness that is overcome in DIALOG.

Online there is an even distribution of response times for all searches with a very small variability. Additionally, the PsycINFO searches were made longer by limiting the entire set by date to match the date coverage in PsycLIT. This added 12 seconds on the average to each search. If this is not done, DIALOG's response time improves even more.

Unique Retrievals

Table 2 lists the reasons for retrieving unique documents in each system for the six psychology searches. On the whole, as expected, DIALOG retrieved more due to monthly updating and inclusion of dissertations, i.e., there are simply more documents on PsycINFO at any given time than on PsycLIT. Dissertations account for 46% (24) of the unique documents, publication year 1990 accounts for 35% (18), and a publication year of less than 1990 accounts for 10% (5).

The label on the PsycLIT disk received in September 1990 reported coverage from 1/83 through 6/90. Most users assume that the database contains documents with publication years ranging from 1983 through June 1990. Inspection of the unique documents revealed that there are older documents on the disk, dating from publication year 1979. These are on the disk because the date they were entered into the database was 1983 or later. In an effort to make the searches equivalent by publication year, we excluded older documents in the DIALOG searches with the date limiter 1983:1990. Thus, most of the documents unique to PsycLIT were due to this discrepancy between publication year and coverage date.

We found no documents in the CD-ROM searches with a publication year greater than 1989. Thus, even though the PsycLIT screen states that coverage is through June 1990, there are no records with publication year 1990. According to Jacso, who studied the update field for 1990 in PsycLIT, 31% of the documents bear 1990 publication dates, 48% have 1989 publication dates, and 21% were published in 1988 or 1987 [9]. For PsycLIT it takes four years to enter all the documents of a given publication year into the database. Searchers should be aware that the most current date on the disk label does not mean that all (or even most) of the articles published during that year are on the disk. (Editor's Note: According to the database producer, the majority of publications enter the database within a range of 3 to 23 months, with the average being 12 months. They consider four years to represent the outer most edge of time. See sidebar elsewhere on this page for Peter Jacso's comments on the update discrepancy.--PH)

There is only one document unique to PsycLIT that is unaccounted for. In search A one record was not retrieved on DIALOG. A known item search retrieved the record online, but when we compared it to the corresponding PsycLIT record we could discover no reason for its omission, since the search terms appear in the Identifier field as they do in the Key Phrase field in PsycLIT, the copyright date is 1984, and the publication years match (1986), and are within the date limit imposed on DIALOG. It may be a case of record loading error as found in the PAIS study.

Search Costs

Table 3 shows the average cost per DIALOG search is about $35, including charges in File 11 ($.92 per minute), TYMNET charges ($12 per hour) and online type charges ($.35 per record). This would be slightly lower with a 2400 or 9600 baud modem and averages around $31 if offline prints ($.25 per record) are substituted for online types. The annual cost of SilverPlatter's PsycLIT multiuser subscription is roughly equivalent to 145 to 165 DIALOG searches per year. End-users in Hamilton Library's busy CD-ROM reference area perform mroe than 165 searches per week. However, since most libraries charge their patrons for online searches, the end-users are saving the money, not the libraries.

SOCIOLOGICAL ABSTRACTS

Sociological Abstracts is available online on several online systems including DIALOG and on SilverPlatter CD-ROM. The CD-ROM version is known as sociofile. Like Psychological Abstracts, the online and CD-ROM versions have some notable differences. Sociological Abstracts online (DIALOG File 37) includes journal articles, book reviews, monographs, conference papers, dissertations, and other miscellaneous document types. It is updated five times per year and covers 1963 to the present. sociofile is a subset of Sociological Abstracts that includes only journal articles and dissertations. The CD-ROM is updated thrice yearly and covers 1974 to the present [10]. (Both the DIALOG file and the sociofile disk include a second database, the Social Planning/Policy and Development Abstracts, SOPODA.)

DIALOG charges $69 per hour for Sociological Abstracts, plus telecommunications network charges, and $.45 per full record typed online or printed offline. The annual cost of SilverPlatter's Sociofile is $2995 for a networked/multiuser system or $1950 for a single user system.

Sociofile was searched on the University of Hawaii's LAN. We did the online searching on a 2400 baud modem to see if the response time variations noted in the psychology searches would be greater at that speed.

Strategies

We obtained six sample DIALOG search strategies from Sociological Abstracts, Inc. and translated them into equivalent SilverPlatter search statements (see Appendix beginning on page 49). The strategies use search capabilities common to both systems. All the searches use field limiting to one or more fields. As discussed above, DIALOG has the advantage since it allows multiple field limiters per concept, while SilverPlatter allows only single field limits. Thus, on SilverPlatter, the set must be limited to each field separately and then these sets must be ored. For example, in searches V [divorce mediation] and VI [intervention programs for pregnant teens],

the searches were limited to the Title, Descriptor, and Index Phrase fields.

For some complex strategies DIALOG has another advantage since the strategy may be entered as one statement, while SilverPlatter requires the strategy to be entered in several statements. Search VI requires five steps on CD-ROM and Search V requires two steps.

To standardize the retrievals, all the searches were limited by publication date within two to five year ranges. This resulted in more consistent retrievals in SilverPlatter than in the previous search of the entire disk. All of the searches combined free-text searching with field searching and date limits, and most included truncation.

Retrievals

Table 4 shows the results for the sociology databases. The pattern of results obtained for the psychology databases reported in Table 1 was replicated in sociology. DIALOG's Sociological Abstracts (SA) retrieved a significantly higher number of documents; seven more per search on average. Twenty-two percent of the DIALOG retrievals were unique to the SA database, while there were no unique documents on sociofile. This significant difference is as expected since the online database covers more document types and is more current.

Unlike the psychology searches, which were conducted at 1200 baud, the search time for the sociology online searches at 2400 baud is statistically significantly faster than the CD-ROM database (1'05" vs. 1'58"; Table 4). On the other hand, the standard deviations are comparable in this case. The typical SilverPlatter sociofile CD-ROM search will be about twice as long as the typical DIALOG online search at 2400 baud. The variability for the CD-ROM searches is likely to be larger than for the online searches, with some CD-ROM searches taking over three minutes. The longer response times on CD-ROM for searches V and VI may be caused by free-text and truncation. This is important since novice searchers normally use free-text searching, as they are less familiar with controlled vocabulary and hyphenated field searching.

Unique Retrievals

Table 5 gives the reasons for unique retrievals in the SA online database. There were no documents unique to the CD-ROM database. All but one of the searches were limited to publication year ranges of from two to four years. This permitted us to control for the variability in publication year coverage in SilverPlatter that was discovered when searching the entire PsycLIT database. SA includes more document types than Sociofile. Book reviews and association papers account for 32% (14) of the unique documents, publication year 1990 accounts for 48% (21) of unique retrievals, and a publication year less than 1990 accounts for 20% (9). Thus, one-third of the differences are due to document types excluded from the CD-ROM database, while nearly one-half are unique because they are current publications. On the sociofile disk labeled 1974-8/90 we retrieved no documents with a 1990 publication date. This confirms the time lag coverage pattern discovered in the PsycLIT database.

Subsequent known-item searches of unique documents retrieved on DIALOG SA showed that articles published in 1990, and several published in 1988 or 1989, were not available on CD-ROM until March 1991. Such documents have 1990 Sociological Abstracts copyright dates, but have publication years of 1988 or 1989. For example, for sociofile searches I (AIDS and drug abuse), III (burnout in social workers), V (divorce mediation), and VI (intervention programs for pregnant teens), nine documents were not on the disk that have publication dates within the limits, and copyright dates of 1990. This indicates that the sociofile database is behind at least one publication year, and as much as two years for some documents. Examination of the publication dates for all the unique documents from the SA searches revealed that the 1974-8/90 sociofile disk includes most articles published through late 1989; while the 1974-12/90 disk includes most articles published through early 1990.

Search Costs

Table 6 shows that the cost of the average DIALOG search in File 37 is about $20, including file charges ($1.15 per minute), telecommunications charges ($11 per hour), and online type charges ($.45 full format). For the annual multiuser cost of SilverPlatter's sociofile ($2,995) a library could do about 150 DIALOG searches.

CD-ROM vs. Online

To investigate the effect of CD-ROM vs. online searches independently of field of study and database, we combined the six psychology and six sociology searches. Table 7 shows the combined results. The online system yields significantly more hits per search on the average (36 vs. 30). This represents a 19% advantage in the number of retrievals online. This difference also shows up in the unique documents online (7 vs. .8). On the other hand, the time differences are not significant, reflecting the large difference in the standard deviations (1'55" vs. 20", F=5.9). As discussed above, this indicates that the psychology and sociology databases respond differently in search characteristics with techniques such as free-text and truncation.

In summary, these combined results show that the online system will yield more hits and more unique documents, while the time differences depend on specific databases.

CONCLUSIONS

The results of this study contrasting CD-ROM and online versions of databases confirm that though the databases may be very similar, significant differences do exist. Specifically, online searching gives a more consistent or predictable response time and yields greater coverage, content, and currency.

These differences may or may not be important to non-expert end-users. They may be more tolerant of longer or less predictable response times and may be so pleased with what they do retrieve, they will not care what is missing from the CD-ROM version. On

the other hand, some may want to retrieve very current documents and may believe they will be able to do so if they take disk labels at face value[11].

APPENDIX

```
SEARCH TOPIC AND SEARCH STRATEGY FOR SILVERPLATTER AND DIALOG PSYCHOLOGY DATABASES SEARCH TOPIC SEARCH STRATEGY Seasonal
affective disorder SEARCH[A] PsycLIT SEASONAL AFFECTIVE DISORDER IN TI OR SEASONAL AFFECTIVE DISORDER IN KP PsycINFO S
SEASONAL()AFFECTIVE ()DISORDER/TI,ID Resistance to group psychotherapy SEARH [B] PsycLIT GROUP-PSYCHOTHERAPY IN DE AND
PSYCHOTHERAPEUTIC-RESISTANCE IN DE PsycINFO S GROUP PSYCHOTHERAPY AND PSYCHOTHERAPEUTIC RESISTANCE
```

Death attitudes in healthy children SEARCH [C]

```
PsycLIT DEATH-ATTITUDES IN DE AND CHILDREN IN DE #1 NOT (32 IN CC OR 322 IN CC) PsycINFO S DEATH ATTITUDES AND
CHILDREN/DE S S1 NOT SH=(32 OR 33) Type A behavior SEARCH [D] PsycLIT TYPE A BEHAVIOR IN TI OR TYPE A BEHAVIOR IN KP OR
CORONARY-PRONE-BEHAVIOR IN DE #1 AND LITERATURE REVIEW IN DE PsycINFO S TYPE()A()BEHAVIOR/TI,ID OR CORONARY PRONE
BEHAVIOR S S1 AND LITERATURE REVIEW Empty nest syndrome SEARCH [E] PsycLIT EMPTY NEST IN TI OR EMPTY NEST IN KP PsycINFO
S EMPTY()NEST/TI,ID Stress in industrial workers SEARCH [F] PsycLIT STRESS IN DE AND (BLUE-COLLAR-WORKERS OR SKILLED-
INDUSTRIAL-WORKERS) IN DE PsycINFO S STRESS/DE AND (BLUE COLLAR WORKERS OR SKILLED INDUSTRIAL WORKERS) SOCIOLOGY
DATABASES SEARCH TOPIC SEARCH STRATEGY Drug abuse and AIDS SEARCH [I] sociofile ACQUIRED IMMUNE DEFICIENCY SYNDROME
(DRUG-ABUSE OR DRUG-ADDICTION OR DRUG-USE) IN DE #5 AND #9 SA SS ACQUIRED()IMMUNE()DEFICIENCY ()SYNDROME AND (DRUG ABUSE
OR DRUG ADDICTION OR DRUG USE)/DE
```

TABLE 3

```
DIALOG SEARCH COSTS FILE 11 PsycINFO ONLINE TYPE CHARGE OFFLINE TYPE CHARGE TOTAL $208.11 $185.21 MEAN $34.69 30.87
```

TABLE 5

```
REASONS FOR UNIQUE RECORDS IN EACH SYSTEM FOR SIX SEARCHES SEARCHES (n=) REASONS FOR UNIQUE RECORDS [1] sociofile (0)
(All documents found online.) SA (29) Association Paper (10) (35%) PY=1990 (14) (48%) Copyright 1990, publication year
<1990 (5) [II] sociofile (0) (All documents fond online.) SA (1) Association Paper [III] sociofile (0) (All documents
found online.) SA (2) PY=1990(1) PY=1989 (Dissertation) (1) [IV] sociofile (0) (All documents found online.) SA (0) (All
documents found on cd-rom.) [V] sociofile (0) (All documents found online.) SA (4) Book Review (1) PY=1990 (2) Copyright
1990, publication year <1990 (1) [IV] sociofile (0) (All documents found online.) SA (8) Association Paper (2) PY=1990
(4) Copyright 1990, publication year <1990 (2)
```

TABLE 6

DIALOG SEARCH COSTS

FILE 37 SA ONLINE/OFFLINE TYPE CHARGE

```
TOTAL $122.22 MEAN $20.37
```

TABLE 7

```
COMBINED SYSTEM COMPARISON MEASURES FOR CD-ROM AND ONLINE DATABASES CD-ROM ONLINE CD-ROM ONLINE CD-ROM ONLINE HITS HITS
UNIQUES UNIQUES TIME TIME N N N N TOTAL 354 430 10 86 22'48" 15'50" MEAN 29.50 35.83 .83 7.17 1'54" 1'19" SD 17.40 22.40
1.47 7.84 1'55" 20" *Z 2.81 2.81 .20 p= .005 .005 n.s.
```

REFERENCES

[1]Tenopir, Carol. "The Impact of CD-ROM on Online." Library Journal 116 (1 Feb. 1991): pp. 61-62. [2]Anders, Vicki and Kathy M. Jackson. "Online vs. CD-ROM: The Impact of CD-ROM Databases Upon a Large Online Searching Program." ONLINE 11, No. 6 (Nov. 1988): pp. 24-32. [3]Stewart, Linda, Katherine S. Chiang, and Bill Coons, eds. Public Access CD-ROMs in Libraries: Case Studies. Westport, CT: Meckler, 1990. [4]Tenopir, Carol. "The Same Databases on Different Online Systems." Library Journal 116 (1 May 1991): pp. 59-60. [5]Clark, Katie. "Comparisons of Online and CD-ROM Databases: Content and Retrieval Differences." In: ONLINE '90 Conference Proceedings. Weston, CT: Online, Inc., 1990. pp. 36-37. [6]Kluegel, Kathleen and Eric Loehr. "Can I Find it On PAIS? Comparing PAIS on CD-ROM and PAIS on DIALOG." DATABASE 13, No. 6 (Dec. 1990): pp. 37-42. [7]Preschel, Barbara M. "Response to |Can I Find it on PAIS?" DATABASE 13, No. 6 (Dec. 1990): pp. 43-44. [8]Tooey, Mary J. "PsycLIT on CD-ROM: The UMAB Experience OR Serving Psychological Abstracts to Library Users on a SilverPlatter." In: ONLINE '86 Conference Proceedings. Weston, CT: Online, Inc., 1986. pp. 246-260. [9]Jacso, Peter. CD-ROM Software, Dataware, and Hardware: Evaluation, Selection, and Installation. Englewood, CO: Libraries Unlimited, 1991. Chapter 3 "Dataware Quality." [10]Blackman, Michelle and Miriam Chall. "Sociological Abstracts: an Update and Review." In: ONLINE '87 Conference Proceedings. Weston, CT: Online, Inc., 1987. pp. 24-26. Terry Owen. "Sociological Abstracts, Inc: Update." In: ONLINE/CD-ROM '90 Conference Proceedings. Weston, CT: Online, Inc., 1990. pp. 129-131. [11]Charles, Susan K. and Katharine E. Clark. "Enhancing CD-ROM Searches With Online Updates: An Examination of End-User Needs, Strategies, Problems." College and Research Libraries 51 (July 1990): pp. 327-328.

DIANE NAHL-JAKOBOVITS is a Instructor at the School of Library and Information Studies, University of Hawaii, and a doctoral student in the interdisciplinary doctoral program of Communications and Information Sciences. She holds degrees in psychology and library and information science. CAROL TENOPIR is an Associate Professor at the School of Library and Information Studies, University of Hawaii. She is the author of several books and many articles on various aspects of databases and online searching. Her monthly column "Online Databases" has appeared in Library Journal since 1983.

Source Citation   (MLA 8th Edition)

Nahl-Jakobovits, Diane, and Carol Tenopir. "Databases online and on CD-ROM: how do they differ, let us count the ways." *Database*, Feb. 1992, p. 42+. *Gale Academic Onefile*, https://link.gale.com/apps/doc/A11729194/AONE?u=tel_a_utl&sid=AONE&xid=10463316. Accessed 5 Oct. 2019.

Gale Document Number: GALE|A11729194