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# Online Searching with a Microcomputer

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The online industry is now about fifteen years old.<sup>1</sup> Microsearching (online searching with a microcomputer) began in the 1980s. To say that the use of microcomputers is widespread is an understatement. There are now seventeen million microcomputers in U.S. homes and offices, ten percent of which have modems attached to them. There are therefore, at least 1.7 million potential microsearchers in the U.S.<sup>2</sup> Microcomputers are used in libraries for a variety of functions, such as word processing, serials control, interlibrary loan, and of course online searching. Before the advent of microsearching, online searchers were limited to computerized literature searching on dumb terminals. I began with a Texas Instruments Silent 700 dumb terminal with a print speed of 30 characters per second. When our library purchased two IBM-PCs for the reference department, we acquired many new capabilities for online searching. As I began to experiment with microcomputers, I began reading all I could find about microsearching. This article is an outgrowth of my excitement and curiosity about its capabilities.

## Hardware and Software for Microsearching

The equipment, or hardware, needed includes a microcomputer with a keyboard, a monitor, a communications card, a printer, and a modem. The modem is a device that transforms telephone signals into a form the computer can understand. Modems transmit at 30, 120, and 240 characters per second. These correspond to bits per second (bps), rates of 300, 1200, and 2400, respectively. In our library we now use an IBM-PC with two disk drives and 256k of memory, a 2400

bps Hayes Smartmodem, and a dot matrix Oki-data style printer.

The term "software" refers to function-specific instructions for the microcomputer. Many different types of software are available; microsearching requires *telecommunications* software. CROSSTALK version XVI is considered to be the best on the market for microsearching. Another good telecommunications software package is SMARTCOM II. The cost of the hardware plus the software normally ranges from \$1,500 to \$3,700.

## Automatic Log-on

Automatic log-on is one of the most commonly used features of microsearching. Every database vendor has its own required log-on protocol. To use automatic log-on, the searcher first creates and stores a log-on protocol, using telecommunications software for databases used. This eliminates the need to execute the log-on protocol manually each time a searcher accesses a database. With these protocols, the computer dials the telecommunications company's telephone number, redialing the number if it is engaged, inputs the special address characters of the vendor, and then enters the searcher's password or passwords. This is one of the great advantages of using the microcomputer, even if one uses only one vendor or telecommunications facility.

## Uploading

Another capability of microsearching is uploading. Uploading means creating and storing a query in advance on the microcomputer, then going online, and transmitting the whole query to the host system with a minimum of typing while online.<sup>3</sup> The advantage of uploading is that much of the time-consuming typing, correcting, and editing is done offline, saving online time, which in turn saves money. Many of the gateway and front end systems which will be discussed later include the uploading capability. CROSSTALK, version XVI, is one of many different software packages that can be used for uploading.

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## Downloading and Editing

Another definite advantage of microsearching over searching on a dumb terminal is the ability to download to a disk. Downloading is the transmission of data from remote host computers to the user's microcomputer for later searching, manipulation, or storage.<sup>4</sup>

One of the most popular reasons to download is to edit the search before it is given to the requester. This allows confusing system messages to be deleted, irrelevant citations to be deleted, annotations or notes to be added to certain citations, and specific text elements to be highlighted. Cover sheets containing such elements as the title of the search, the date, the requester's name, and the searcher's name can be included. Actually, cover sheets can be prepared by the microcomputer even if one does not download. Editing a search makes it more professional, more relevant, and customized. A significant cost advantage of downloading is that data can be downloaded at modem speed, rather than the slower printer speed, and then subsequently printed offline. By downloading one can provide the requester with a diskette copy of his search rather than a paper copy. This allows the patron to transfer electronically the citations into his own personal microcomputer data files. The electronic transfer saves the intervening steps of inputting the citations manually from a paper printout. Some librarians download to allow transmission of searches via telephone to the requestor's microcomputer.<sup>5</sup>

Downloading falls into three general categories. The first is downloading for temporary and short term storage for purposes such as editing or printing search results after disconnecting from the online system. Category two is long-term storage for an indefinite period of time and reuse at the downloading site. The third includes other uses such as the multiple copying of data, the creation of specialized databases, information bulletins, bibliographies, or literature reviews.<sup>6</sup>

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**A significant cost advantage of downloading is that data can be downloaded at modem speed, rather than the slower printed speed, and then subsequently printed offline.**

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Both librarian searchers and "end users" have a definite need for downloading and are not wor-

rying very much about the associated legal issues. There are three reasons why searchers are not too concerned about the legal ramifications: (1) most database producers are vague about their policies, (2) the courts have not yet made a decision about the issue, and (3) it is currently impossible for a database vendor (such as BRS or DIALOG) to detect whether a searcher is printing his search results on paper—or whether he is downloading the search results.

What about the database producers? How do they view the "downloading" issue? This varies. Many producers are mailing downloading license agreements to searchers to sign and return. For example, DIALOG mails "Database Supplier Terms and Conditions" sheets to its customers. These sheets state the position of the database producers on downloading. Unfortunately these statements are extremely vague with respect to downloading. For example, the Dissertation Abstracts Online Policy printed within DIALOG's periodic Supplier Terms and Conditions Sheets contradicts itself. It states under what conditions downloading is permissible, and then it says downloading is not allowed. I called one of DIALOG's customer service representatives in an attempt to clarify some of the downloading statements of individual database producers. I was advised to contact the individual database producers for clarification. When I continued to complain that the downloading policies are confusing, and in some cases, contradictory, I was told: "What you do with downloaded information is of concern to the database producer—NOT DIALOG. DIALOG has no way of knowing what its customers do with the data after it is transmitted." While many database producers do not state explicit downloading policies, a few producers are making their policies crystal clear. For example in 1985 in *Online Review*, the Aerospace Database did an excellent job of reporting its downloading policy.<sup>8</sup>

BIOSIS also has attempted to clarify its policy on downloading by publishing the downloading policy along with specific examples of downloading.<sup>9</sup> Furthermore, BIOSIS offers BITS to its customers on a regular basis through the mail for a fee. BITS are subject specific portions of the BIOSIS database downloaded onto disk. Thus BIOSIS accepts downloading as a fact of life, and in turn generates additional revenue through downloading.

Obviously there are still many issues to be clarified with downloading. The National Commission on New Technological Uses of Copyrighted Works reported that copying an entire

database for commercial gain would be an infringement of copyright, whereas the copying of small parts of the database would not be an infringement.<sup>10</sup> The problem is—how much is a "small" amount of a database?

### End User Searching

Having discussed uploading, downloading, and editing, I will now focus on an important group of microsearchers—the end users. Understandably, most microcomputer owners want to take advantage of the various capabilities of their expensive equipment. The term "end user," refers to the requesters of the information retrieved. Librarians, as search analysts, are intermediaries. End user searching is a trend which is gaining momentum. It should not be ignored. One reason for this trend is the intensive promotional advertising in computer magazines and professional journals. While database producers have saturated their markets for the professional search intermediaries, the present online growth rate *must* continue, if the industry is to remain profitable. The industry has, therefore, been targeting its advertising toward professionals and home computer owners. From 1981 to 1984, the end user segment of the market grew faster than any other part.<sup>11</sup>

For the average microcomputer owner to begin online searching, all he needs to do is purchase a modem. Modem costs have dropped dramatically. Costs range from as little as \$100 for a 300 bps modem, to about \$800 for a 2400 bps modem.<sup>12</sup>

I chose to include a discussion of end user searching here because in most cases end users search with a microcomputer rather than a dumb terminal. Because of their menu-driven searching format and extensive online help options, end user databases are generally easier, but slower, to search. The expression "user friendly" is applied to these search systems. User friendly systems for medical professionals include BRS/Colleague, AMA/Net, and PaperChase. BRS/After Dark and Knowledge Index are other options.

Although some articles and advertisements in popular and computing literature lead one to believe the contrary, even user friendly software requires some end user training. End users need instruction on such topics as Boolean logic, the use of controlled vocabulary, and how to narrow or broaden a search strategy.

Our library subscribes to several end user database systems. We own the manuals and provide technical advice in response to user inquiries

and offer a four-hour class on searching MEDLINE using BRS/Colleague. The class is a prerequisite for individuals who wish to use the microcomputers in the library's AV/Microcomputer Department for searching BRS/Colleague. Patrons are responsible for all charges incurred while running their searches.

The library has also established a group account with BRS/Colleague. Individual faculty or departments in the School of Medicine can obtain passwords for this account and use their own or the library's microcomputers for searching. Members of the group account thus avoid the \$75 registration fee and the \$15 monthly minimum charged to individual subscribers.

Librarians benefit greatly from being the teachers and promoters of end user database searching. The major benefit is that our clientele will look to us as the leaders and the experts in this area. Another benefit is that we can teach our clientele under what circumstances they should and should not run their own searches. If we librarians act as promoters of end user searching rather than avoiders or evaders, then we can have significant control over this ever increasing trend. If not, then we may lose our niche in the world of online searching.

### Gateways and Front Ends

Many different software products are now available to ease the mechanics of the search process, particularly for end users. Although available in experimental form since the 1970s,<sup>13</sup> these "gateways" and "front ends" began to appear on the market in the 1980s.<sup>14</sup> SCIMATE was one of the first, appearing in 1983. EasyNet became available in 1984, as did "IN SEARCH."<sup>15</sup> IN SEARCH was upgraded to PRO SEARCH in 1985,<sup>16</sup> and the National Library of Medicine recently introduced "GRATEFUL MED."<sup>17</sup>

One can become easily confused about the definitions of gateways and front ends because sometimes the literature is inconsistent, and some authors use the terms interchangeably. There is, however, an important difference between the two. Gateways take the user to the entrance or gate of the database but no further. On the other hand, front ends lead a searcher through every step of a search in the database. You can visualize the difference between a gateway and a front end by this analogy. A gateway is like St. Peter leading a person up to the gates of heaven. A front end is like a person's guardian angel leading him by the hand through heaven.

A gateway is an interface between the searcher and the database. It stores log-on protocols of DIALOG, NLM, SDC, DATA-STAR, and other database vendors, and then automatically dials the telephone number, transmits the vendors' address code, and send the user's password(s). The term "gateway" implies that the user is taken to the entrance or gate of the database, but no further.<sup>18</sup> The user is on his or her own to select the database and search using the software commands of the vendor.<sup>19</sup> Since the users of gateways must know all the intricacies of online searching, gateways are designed for librarians or other search analysts *more* than for end users. By subscribing to a gateway, the user receives a single bill for all the searching done on any vendor's system, and all bills arrive together in a single envelope. PC-Net Link is an example of a gateway.<sup>20</sup>

Front ends are designed with the end-user searcher in mind and have all the capabilities of gateways plus some additional ones. Front ends simplify many aspects of the online search process.

The searcher may be given the option of selecting the database to search, or the front end can make the database selection after asking the user a series of questions regarding his topic.<sup>21</sup> Once the database has been selected, it is *not* mandatory for the searcher using a front end to know anything about Boolean logic or controlled vocabulary.<sup>22</sup> It should be pointed out, however, that to the extent that the searcher does not prepare a search strategy nor take full advantage of controlled vocabulary, this mode of searching is less powerful and less precise than directly searching a vendor such as DATA-STAR. The front end translates the simple commands or menu choices of the end user into the language of the database vendor. Some front ends even act as "emulators" allowing the commands of one vendor, such as DIALOG, to be used when connected to another vendor, such as BRS.<sup>23</sup> Aside from this latter capability, front ends are designed primarily for end-user searching, rather than for the professional searcher. Front ends are menu driven and, therefore, time consuming and tedious to the experienced searcher. Front ends, however, help the end user by executing log-on protocols and by making many aspects of online searching transparent to the end user.<sup>24</sup> Thus, front ends can be considered an *electronic* intermediary substituting for the *human* professionally trained intermediary. Although front ends are extremely useful for inexperienced end users, there are costs and sacrifices associated with choosing this

alternative.

ProSearch is an example of a front end marketed by an independent company which is *not* a database vendor. Many database vendors who vigorously promote end user searching also offer software that simplifies searching. DIALOG developed and markets Knowledge Index, whereas BRS developed and markets BRS/Colleague and BRS/After Dark.

The most elaborate of all front ends, EasyNet, offers some interesting capabilities and has a unique pricing structure. To access the system, the end user dials a direct toll-free number rather than using the traditional telecommunications network. The system chooses the database for the end user, then modifies the user's casual search topic into a more sophisticated search strategy. There are *no* sign up fees, subscription charges, nor monthly minimums. EasyNet charges *only* if citations are displayed. The system charges a modest \$8 for each 10 citations.<sup>25</sup> Users can pay for their citations by Mastercharge, Visa, American Express, or even a more mundane preestablished account.<sup>26</sup> EasyNet, available 7 days a week and 24 hours a day, offers access to 700 databases through 13 online services, such as DATA-STAR, and DIALOG.<sup>26</sup> EasyNet also offers some sophisticated capabilities to its users. Unfortunately, this technologically advanced system may not retrieve the most relevant citations on a search topic. For example, a user's search topic on heart attack and exercise may retrieve one thousand citations, of which EasyNet prints the first ten. As experienced searchers know, the first ten of one thousand citations are seldom the best ones.<sup>27</sup>

Other gateways and front ends not mentioned thus far include Superscout, Search Master, Search Helper, MicroDisclosure, Micro Cambridge, PC/Net-Link and IT. New front ends and gateways continue to appear with software enhancements. As the competition in this market increases, some companies will, no doubt, go out of business. In fact, in May 1986 Menlo Corporation, which offered Pro Search, was taken over by Personal Bibliographic Software, Inc.<sup>28</sup>

### Accounting Systems

Another unique capability of online searching with a microcomputer-software is the facility for handling accounting and billing. There are a few accounting systems which do much more than display the cost at the end of a search and send a bill at the end of a month.

The front end ProSearch contains a sophisticated accounting system which tracks search

costs for the searcher. The program automatically identifies every search session by date, time, database searched, customer name, department code, and searcher's name. The searcher can print invoices and cover sheets for each search as well as generate monthly search summaries for billing and accounting purposes.<sup>29</sup>

Another accounting system has been produced by the end user Service, BRS/Colleague. This accounting system, named PROMPT, is available only for those using the BRS/Colleague system. PROMPT was designed as a cost accounting system which allows the library's clientele to perform online computerized literature searches using the library's hardware. PROMPT allows a library to enter any dollar rate per hour that it wishes to charge its clientele. One rate can be established for the searching done during the daytime, and another rate can be set for searching during the evening. After the end user runs his search, a bill is printed using the rate the librarian has established. PROMPT also keeps track of the total time the system is used and generates a bill of cumulative use for each user. A needed improvement in the PROMPT software is the ability to set the hourly rates depending on the cost of the database searched.

### Database-Management Systems

A database-management system is a microcomputer software program which allows for the capture, editing, filing, and retrieval of data. For the most part, database management systems are used for purposes *other* than manipulating downloaded citations from an online literature search. This discussion, however, will cover only those database-management systems that are used for bibliographic records. The database management systems to which I am referring could more accurately be described as bibliographic management systems. This is a very small subset of the entire universe of database management systems.

Some end users perform online searches and then routinely download the retrieved citations into a permanent file. The purpose of this permanent file is to compile a database of citations that are pertinent to the specific interests of the end user. It is imperative that the end user be able to retrieve citations from this file as needed. For example, consider an end user who is an endocrinologist doing research in diabetes. Citations to 15,000 journal articles are in his file on this topic. The endocrinologist wants to retrieve journal articles from his file on the topic "bedtime insulin injections." Our researcher certainly does *not* want to look at every one of those 15,000 citations

in this file to select the citations covering bedtime insulin injections. Therefore, he uses a database management system which will allow him to select the specific citations he desires.

Good database management systems should have the following capabilities:

1. The ability to download citations into a database without having to retype them.
2. Boolean Retrieval
3. Truncation
4. Phrase Searching
5. Retrieval by All Fields.<sup>30</sup>

Many different database-management systems for bibliographic records are available. These include: Zy Index, Pro-Cite, and Golden Retrieval. DBASE III+, the number-one selling database management system for personal computers, can also be programmed to handle bibliographic citations. Furthermore, the front end SciMate contains a built-in database management system.

Database-management systems must be used with a microcomputer rather than a dumb terminal. The ability to utilize database-management systems is another of the many advantages of online searching with a microcomputer.

### Trends and Innovations

Microsearching is a relatively recent phenomenon and in a state of flux; therefore it is difficult to predict the future. During the course of this paper I have already alluded to some trends in my discussion of downloading, gateways, and front ends. Here, perhaps, are some trends and innovations indicated for the future.

1. The online industry will continue to grow. In 1985, Business Communications Company published a report saying that the online industry "could very well maintain a 23 percent a year average growth rate through the next decade."<sup>31</sup>
2. New gateways and front ends will continue to appear on the market, and competition in the online industry to fill this need will continue.
3. Greater numbers of online searchers are switching from dumb terminals to microcomputers to take advantage of the vastly greater capabilities of microcomputers.
4. More full-text databases are becoming available in response to searchers who need the original source rather than simply a bibliography. This trend is an outgrowth of the blossoming electronic publishing industry, and also of the increased capacity and reduced cost of the electronic storage media.
5. Telecommunication facilities such as Telenet and Tymnet are offering faster bps rates.<sup>32</sup> This

could lead to further changes in pricing online products.

6. The command languages used by vendors such as DIALOG and DATA-STAR are becoming more powerful.<sup>33</sup>

7. Voice output is currently available for some microcomputers. A recently released version of Pro-Search supports a voice communications option.<sup>34</sup> This technology "may come into use ... as a ... channel for control and error information relative to a search, or for use by visually impaired searchers."<sup>35</sup>

8. The customer support from vendors is expanding. For example, in 1985 DIALOG received over four hundred telephone calls for assistance each day from its customers, whereas in 1986 DIALOG has been averaging 440 calls per day.<sup>36</sup>

9. The online industry is quite willing to adjust to fill the varied niches in the information retrieval market place. After-hours searching is an example of this flexibility.

10. In 1985, DIALOG's president, Roger Summit, forecasted multifile searching, i.e., searching several databases simultaneously.<sup>37</sup>

11. One extremely exciting and revolutionary trend is that database producers are beginning to make their databases available on CD-ROM (Compact Disk Read-Only Memory). CD-ROM is a compact disk storage system which is "... used for storage and reproduction of digital data."<sup>38</sup> This technology has definitely captured the imagination of the information industry. A concrete example of this enthusiasm is the new monthly column in the two journals *Online* and *Database* on CD-ROM technology. CD-ROMs are called by several names such as video disks, laserdisks, and optical disks. Traditional online databases can now be stored on CD-ROM eliminating telecommunications and connect-hour charges. CD-ROM workstations require three pieces of equipment: (1) a microcomputer, (2) a compact disk drive, and (3) a printer. The compact disk drive ranges in price from about \$1,200 to \$2,200.<sup>39</sup> Users of CD-ROM, however, seldom need to concern themselves with the cost of the actual equipment, because CD-ROM systems are sold as a package which includes the disk with the database, the compact disk drive, the retrieval software, and the interface and cabling.<sup>40</sup> Unlike a floppy disk, a compact optical disk stores data by burning pits into the specially coated disk with a laser. The result is permanent and unalterable.<sup>41</sup> The equivalent of 200,000 single-spaced pages can be stored on one CD-ROM.<sup>42</sup> As a further illustration of the capabilities of this technology, one disk contains the storage capacity of twenty pounds of floppy

disks.<sup>43</sup>

If a library chooses to access a database by means of a CD-ROM rather than online, then the library pays for all the searching of the disk only once—when the disk is purchased. There are no additional charges for using the database on disk, because the user is not "online." Using a database on CD-ROM eliminates a searcher's urgency to perform a search as quickly as possible to save money. The widespread practice of using a database on CD-ROM rather than online will naturally reduce the total use of online databases. Furthermore, it may radically change the functions of gateways and front ends.

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### **... front ends can be considered an *electronic* intermediary substituting for the *human* professionally trained intermediary.**

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Several databases are already available on CD-ROM.<sup>1</sup> From Silver Platter the entire *ERIC* database is available for \$3,000, *PsycInfo* is available from 1974 for \$5,000, all of *PAIS* sells for \$3,000, and one year of *EMBASE* costs about \$8,000.<sup>44</sup> Cambridge Scientific Abstracts is offering MEDLINE from 1982 to the present on CD-ROM. Each year of MEDLINE is on a separate disk and costs \$975. The disk is updated quarterly and then cumulated at the end of the year. To compensate for the inconvenience of searching each year of MEDLINE on a separate disk, Cambridge Scientific Abstracts is developing the Jukebox. The Jukebox is a device that will contain space for six to ten disks. A user searching MEDLINE on CD-ROM through the Jukebox enters his search strategy only one time. The Jukebox will automatically search through all its disks.<sup>45</sup>

In the next few years, libraries will purchase CD-ROMs for the databases they use most of the time. For databases that are used infrequently, libraries will continue using the online versions. There are a few drawbacks to using this technology. "[CD-ROMs] are single user systems. The amount of information that can be put on a single disk is limited ... Updates are expensive to produce, and so most database producers now plan to supply them only quarterly. The drives are slow ... and the data transfer rates are also significantly slower ... Another troublesome area is standardization."<sup>46</sup>

Even though there are drawbacks using CD-ROM, the benefits far outweigh all the problems.

One exciting benefit is the ability to reproduce pictures and tables. Currently databases do not contain pictures; if, however, the demand for graphics warrants it, then producers of full text databases may begin including graphics.

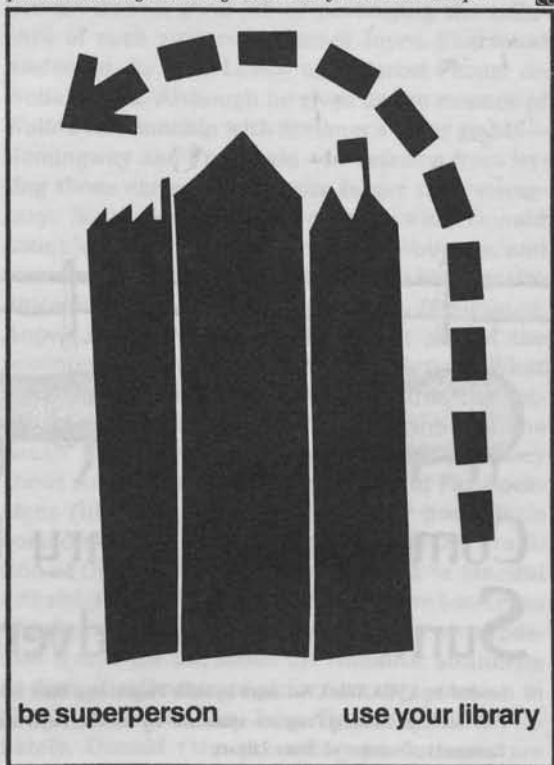
These new technologies will keep the field of online searching in a state of flux for some time to come. It behooves the information specialists to stay abreast of both changes in the online world and technological developments which are making them possible.

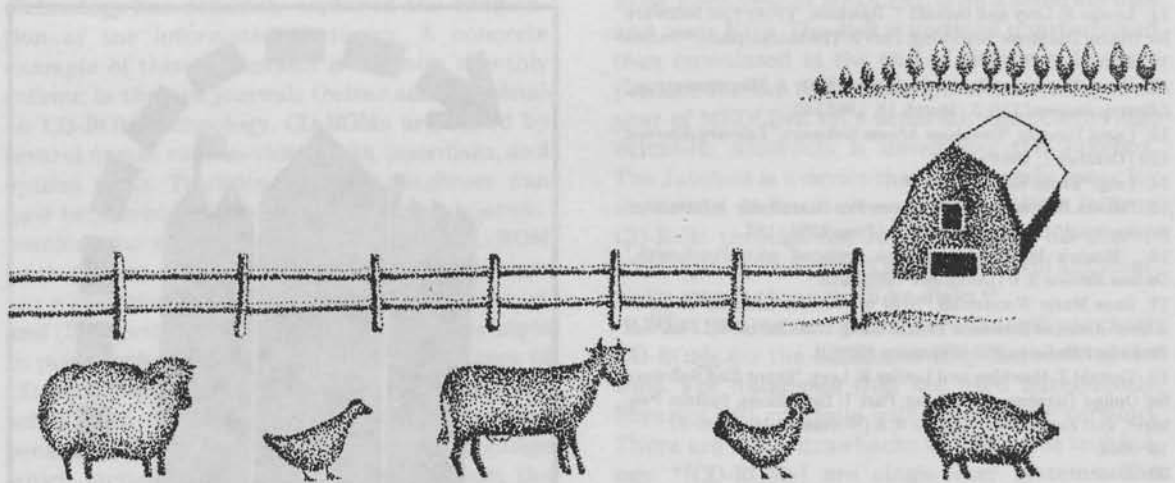
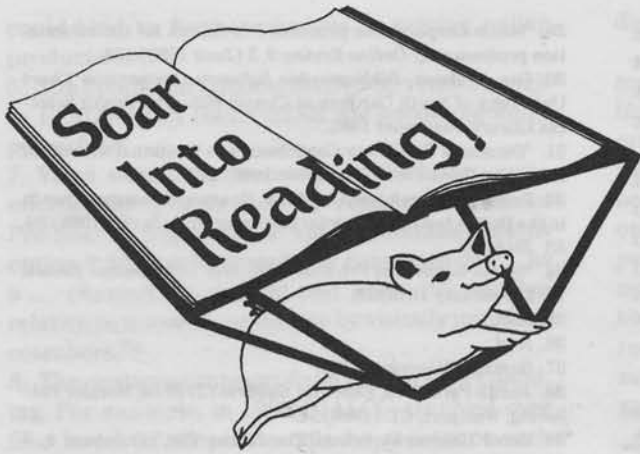
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