ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

PRODUCTION NOTE

University of Illinois at Urbana-Champaign Library Large-scale Digitization Project, 2007.
Software for Patron Use in Libraries

Denise M. Beaubien
Alice Lefler Primack
Colleen Seale
Issue Editors

University of Illinois
Graduate School of Library
and Information Science
Library Trends, a quarterly thematic journal, focuses on current trends in all areas of library practice. Each issue addresses a single theme in-depth, exploring topics of interest primarily to practicing librarians and information scientists and secondarily to educators and students.

Editor: F.W. Lancaster
Publications Committee: Jana Bradley, Leigh Estabrook, Selma Richardson, Lynne Curry, Don Krummel
Managing Editor: James S. Dowling

Library Trends is published four times annually—in summer, fall, winter, and spring—by the Graduate School of Library and Information Science at the University of Illinois, Urbana-Champaign, 249 Armory Building, 505 E. Armory Street, Champaign, IL 61820-6291.

Subscriptions: Rate is $60 per year (plus $5 for overseas subscribers). Individual issues are $18.50 for the current volume year; back issues other than those from the present volume are $10. Claims for missing numbers should be made within six months following the date of publication. All foreign subscriptions and orders must be accompanied by payment. Address orders to: University of Illinois Press, Journals Department, 54 E. Gregory Drive, Champaign, IL 61820. For out-of-print issues, contact University Microfilms International, 300 North Zeeb Road, Ann Arbor, MI 48106. Postmaster: Send change of address to University of Illinois Press, 54 E. Gregory Drive, Champaign, IL 61820.

Copyright © 1991 by The Board of Trustees of The University of Illinois. All rights reserved. Printed in the U.S.A. ISSN 0024-2594

Second class postage paid at Champaign, Illinois.

Authorization to photocopy items beyond the number and frequency permitted by Sections 107 and 108 of the U.S. Copyright Law is granted by the Board of Trustees of the University of Illinois provided that copies are for internal or personal use, or for the personal or internal use of specific clients and provided that the copier pay a fee of 10 cents per page directly to the Copyright Clearance Center (CCC), 22 Congress Street, Salem, MA 01970. The CCC code for Library Trends is 0024-2594/88 $0.10. To request permission for copies for advertising or promotional purposes, or for creating new works, please contact the Graduate School of Library and Information Science, Publications Office, 249 Armory Bldg., 505 E. Armory Street, Champaign, IL 61820.

This journal is abstracted or indexed in Current Contents, Current Index to Journals in Education, Library and Information Science Abstracts, Library Literature, PALS, and Social Sciences Citation Index.

Procedures for Proposing and Guest Editing an Issue of Library Trends

We encourage our readers to submit ideas for future Library Trends themes; issue topics are developed using reader suggestions and recommendations from members of the Publications Committee. We also encourage readers to volunteer to be issue editors or to suggest others who may be willing to be issue editors.

The style and tone of the journal is formal rather than journalistic or popular. Library Trends reviews the literature, summarizes current practice and thinking, and evaluates new directions in library practice. Papers must represent original work. Extensive updates of previously published papers are acceptable, but revisions or adaptations of published work are not sought.

An issue editor proposes the theme and scope of a new issue, draws up a list of prospective authors and article topics, and provides short annotations of the article's scope or else gives a statement of the philosophy guiding the issue's development. Please send your ideas or inquiries to F. W. Lancaster, Editor, Publications Office, 249 Armory Building, 505 E. Armory Street, Champaign, IL 61820-6291.
Software for Patron Use in Libraries

Denise M. Beaubien
Alice Lefler Primack
Colleen Seale
Issue Editors

University of Illinois
Graduate School of Library
and Information Science
ERRATA

Due to our error, Christine Crocker's vita information was omitted from the contributors list in volume 39, number 4. Her vita is as follows:

CHRISTINE CROCKER is University Librarian at the University of Tasmania, Australia. She has held that position since December 1990. Prior to that she was Reader Services Librarian at Deakin University; she has worked in a number of academic libraries in Australia, several of which offered off-campus programs. As recipient of the James Cook Bicentenary Scholarship in 1985, she visited the United Kingdom, investigating library support for extramural students at British universities. She is a consultant trainer for the Australian Information Management Association (AIMA), an organization offering management training programs to librarians throughout Australasia. In Fall 1990, she worked with ARL's Office of Management Services as a Fulbright Senior Scholar. She has been a frequent speaker and author of articles on off-campus library services and in 1986 was the featured speaker at the Off-Campus Library Services Conference in Reno, Nevada.

Also in volume 39, number 4, James S. Healey's article was inadvertently omitted from the Contents page. Mr. Healey's article is on pages 424-40 of that issue. The Publications Office regrets these oversights.
Software for Patron Use in Libraries

CONTENTS

Introduction
Denise M. Beaubien, Alice Lesler Primack
and Colleen Seale  1

Selection of Software for Patron Use in Libraries
Peggy Seiden  6

Intellectual Access to Patron-Use Software
Sheila S. Intner  42

Software for Patron Use in Libraries:
Physical Access
Mary Louise Brady, Ilene F. Rockman
and David B. Walch  63

Copyright and Other Legal Considerations in
Patron-Use Software
R. S. Talab  85

Reference Services and Staff Training for
Patron-Use Software
Linda J. Piele  97

Software for Patron Use in Academic Libraries—
The Texas A&M Experience
Halbert W. Hall and Kathy M. Jackson  120

Public Use of Software
Patrick R. Dewey  139
CONTENTS (Cont.)

Microcomputers in Public Schools and School Libraries  
*June H. Schlessinger and Rashelle S. Karp*  
148

Software as a Library Material in Special Libraries: A Survey and Case Study  
*Laurie E. Stackpole*  
160

About the Contributors  
194
Introduction

DENISE M. BEAUBIEN, ALICE LEFLER PRIMACK, AND COLLEEN SEALE

In 1986, the editors were involved in a software study project at the University of Florida (UF) Libraries. The goal of the project was to establish guidelines for handling software at the UF Libraries. For once we wanted to have guidelines in place before a need became critical, and before we began providing a substantial amount of software for patron use. Our work at the time was primarily theoretical. There was a strong base from which to work, however, since the UF Libraries had been pioneers in collecting data tapes since the early 1970s, and had been using the NOTIS system since 1983. Additionally, the university computing center had been active in providing microcomputing capabilities for the university community.

While preparing these guidelines, the editors examined the literature to see what was being done by other libraries and consulted with campus computer specialists. Much had been written concerning library automation and microcomputer applications for library staff use, but little was documented about patron-use software. This lack of documentation frustrated our efforts. We knew some libraries were providing patron-use software, but, with a few notable exceptions such as the Mann Library at Cornell (Chiang, 1986; Demas, 1985), we had trouble identifying these libraries so that something could be learned from their efforts. After intensive efforts to retrieve
published and unpublished information, it was decided to share our findings with the profession. We published a report (Beaubien et al., 1988) and also were inspired to initiate this collection of writings.

The vision for this issue was to provide one comprehensive guide that covered all aspects of patron-use software in all types of libraries. Thus we provide some articles that detail specific issues and complement them with case studies that cut across all issues while treating each of the major types of libraries. The articles provide literature reviews in the areas of selection, intellectual access (e.g., cataloging and classification), physical access (e.g., circulation and preservation), copyright issues, reference, and staff training. The case studies illustrate how various types of libraries—academic, public, school, and special—cope with those areas. The literature reviews provide the base from which libraries can build policies and procedures. In addition, many of the articles provide some very practical advice. For example, the Brady, Rockman, and Walch article discusses how to clean damaged disks. Throughout this issue of Library Trends, the term software includes virtually anything in computer-readable form, including, but not limited to, laser or optical disks such as CD, CD-ROM, CDI; floppy or hard disks; tape, including cassette, reel, or cartridge; and various online applications. For an excellent discussion of the history of patron-use software, read the introduction to Sheila Intner's article in this issue of Library Trends.

The first five articles cover specific issues. Peggy Seiden discusses the selection process, sources of software information, methods of acquiring software, and collection evaluation. She presents an extensive array of sources for information on software which she labels as horizontal—covering broad genres of software—or vertical—covering specific subject areas. However, she points out gaps in coverage such as a lack of reviews of numeric data files and insufficient anecdotal information on actual use. Seiden concludes that collection development policies must be expanded to include methods of identifying patron needs for software, as well as the related identification and acquisition processes.

Sheila Intner stresses the desirability of using standardized guidelines in her article on intellectual access. In her discussion of "rules and tools," she recommends using AACR2R for descriptive cataloging; established subject headings for indexing, such as the Library of Congress Subject Headings (LCSH); the Dewey Decimal Classification (DDC), and the Library of Congress Classification (LCC); and the MARC Format for Computer Files for creating computerized bibliographic records. Alternatively, many libraries rely on printed lists of titles, and the Hall and Jackson article provides arguments for that approach. However, Intner's recommendations
provide thorough guidelines for libraries that wish to follow a formalized approach which she suggests will remain appropriate over the long run.

Issues of physical access are covered by Mary Lou Brady, Ilene Rockman, and David Walch. They discuss the circulation of software; the pros and cons of maintaining in-house hardware as opposed to circulating software; security issues, including viruses and other disasters; software preservation issues; and physical facilities. They also provide glimpses of applications in specific libraries. They highlight the importance of written policies and guidelines for dealing with materials in specialized and ever-changing formats and point out the need to make software, like any other library format, an easily accessible component of the collection.

Copyright and other legal considerations are the topics of Rosemary Talab's article. She provides guidelines for interpreting copyright law as it applies to patron-use software; discusses recent copyright case law; outlines producers' rights; answers some often asked questions concerning copyright issues; urges use of copyright notices profusely where appropriate; and covers legal aspects of new developments such as electronic bulletin boards, compact disk licensing, and the latest developments in copyright law as they apply to libraries. She emphasizes that, as with all technologies, copyright decisions evolve (often with a loosening of restrictions) as the marketplace determines the possible applications of each generation of new products for the electronic library.

Linda Piele examines issues in providing reference service and staff training for patron-use software. She divides her discussion by the following formats: software on diskette, bibliographic and full-text databases on CD-ROM, and numeric data files. Piele points out the widely held view that technology forces libraries to reevaluate their service roles. The levels of service to patrons and the training of staff are likely to vary from library to library, based on the needs and abilities of each library community. She identifies a trend toward an increased level of service for electronic media and suggests that librarians plan for methods of overcoming obstacles to providing appropriate quality service.

Articles in the second section provide case studies, one from each type of library—academic, public, school, and special. Halbert Hall and Kathy Jackson outline the services provided by the Learning Resources Department (LRD) of the Texas A&M Library as an example of a large and enduring academic library computing center. They emphasize a need for a clear understanding of the mission of any software collection. This understanding will eliminate costly mistakes such as the purchase of hardware that patrons do not choose to use.
Regardless of the mission of a unit that provides software to an academic community, many of the LRD's experiences will prove useful.

Patrick Dewey is a prolific author on computer applications in public libraries. His article in this issue focuses on the unique aspects of public library applications and provides case studies to illustrate the problems and solutions to many issues of patron-use software. Dewey provides a practical approach based on his wealth of experience in all aspects of the electronic library. He recommends developing a well-rounded collection through a variety of software packages and other electronic media to appeal to all ages and levels of interest or expertise.

June H. Schlessinger and Rachelle S. Karp have updated their regular survey of microcomputers in schools and school libraries and the preliminary report of the 1990 survey is included in this issue. The survey identifies trends in purchases and uses as well as the number of microcomputers held. In school library media centers, the same microcomputers tend to be used for both patron-use functions and library management functions. Trends include a shift toward increased use of the most popular brands of personal computers and an increase in the variety of uses per machine. Case studies confirm the tendency that microcomputers breed an interest and/or need for additional microcomputers.

Since few publications exist on the patron use of software in special libraries, Laurie Stackpole provides both the results of a survey of special libraries and a case study. The percentage of special libraries that provide software appears low, and Stackpole hypothesizes two explanations: (1) in some organizations, another unit provides software and microcomputer support, or (2) when an organization's environment does not support the use of software, its library is less likely to include a software collection. The case study of the Ruth H. Hooker Technical Library at the Naval Research Laboratory illustrates a proactive approach to the use of technology which has benefited both the library and its users. The unique relationship between a special library and its clientele, in which the library is attuned to the exact needs of its patrons, allowed the library to tailor its programs and its public relations efforts. However, the ideas presented have applications beyond the realm of special libraries.

These articles delineate the balance libraries are maintaining between treating software as "just another medium" of library material to be treated as any other medium, and allotting the attention and skills needed to accommodate software's peculiarities. For example, selectors in all library types are advised to follow alternative
hardware issues. As patron needs become more specialized, from public to academic to special library users, the selection recommendations narrow: Dewey advises maintaining a well-rounded collection but never losing sight of the hardware and function needs of public library patrons; Hall and Jackson emphasize the need to purchase the packages and hardware that are assured of being used by academic library patrons; and Stackpole recommends purchasing only the titles that have been requested by a special library's patrons. As librarians have learned, selection “mistakes” concerning electronic materials prove very costly and very visible, thus great care in selection is stressed.

Concerns with patron-use software are notable because they cut across all facets of library operations in all types of libraries. A common theme throughout the articles in this issue of Library Trends indicates that policies, procedures, and services must expand to include the new formats housed within the library and also those items to which the “library without walls” has access. As the technology evolves, the editors encourage library decision-makers to take a proactive stance in providing software collections and services to eager patrons.

ACKNOWLEDGMENTS
The editors wish to thank the contributors to this issue, and also acknowledge the contributions made by other members of the original UF Libraries' Software Study Committee: Bruce Emerton, now at California State Polytechnic University; and Erich Kesse, preservation officer at the University of Florida Libraries.

REFERENCES
Selection of Software for Patron Use in Libraries

PEGGY SEIDEN

ABSTRACT
THE LIBRARIAN WHO SEEKS to develop a collection of computer files seems faced with a formidable and often unfamiliar task. This article provides an in-depth study of the selection process for patron-use software programs and data files. It begins with an analysis of the unique characteristics of software—its function, its format, and its mode of publication/distribution. The author discusses whether selection and acquisition can be integrated into existing practices or must be treated in a unique manner. The article covers aspects of the selection process, including the development of a collection policy, the assignment of selection decisions, methods of financing purchases, selection criteria, and the evaluation of individual pieces of software. Sources of information—descriptive, evaluative, and anecdotal—on computer files are listed and described. Acquisition and collection evaluation issues are also discussed.

INTRODUCTION
The librarian who seeks to develop a collection of computer files is faced with a formidable and often unfamiliar task. There are probably over 100,000 microcomputer programs "in print" and a large and ill-defined set of finding and evaluation tools which cannot hope to keep up with the volume. In addition to this unfamiliar body of information with which the software selectors must acquaint themselves, there are technical issues such as system compatibility and legal issues such as licensing and copyright restrictions.

Peggy Seiden, Library, Pennsylvania State University, 3550 Seventh Street Road, New Kensington, PA 15068
LIBRARY TRENDS, Vol. 40, No. 1, Summer 1991, pp. 6-41
© 1991 The Board of Trustees, University of Illinois
Furthermore, the cost of the software is often ten times or more what one would spend on a book, so the pressure to make correct collection decisions is much greater than when dealing with print materials. But in the time it takes the conservative selector to do a thorough evaluation of one software program, a new version may be published. Nor can one rely on printed reviews since there are many types of software for which little information exists. Even the software purchasing process is difficult to integrate into existing acquisition procedures, since the software industry still seems relatively unaware of libraries as a potential market for the products.

Nevertheless, though much about software selection is new and different, there are many aspects that require the same treatment as librarians give to other types of materials. This dichotomy between what is familiar and what is not has led to two schools of thought among librarians about how to treat these materials (Johnson, 1990, p. 7). While one school of thought says that computer files require a totally new approach, new staffing, new policies and procedures, the other thinks that computer files should be integrated into the existing library structure.

In truth, the choice is not so black and white as it first appears. The nature and types of computer files are very complex, and this complexity requires that the library use a mix of approaches in selecting these materials. This article presents an overview of the selection and acquisition process for the types of computer software which libraries typically collect for use by their patrons. Computer software is defined broadly to include not only software programs, but data files and other types of electronic resources as well.

BACKGROUND

Most of the literature concerning the introduction of the microcomputer as a library public service was written in the early to mid-1980s. A review of the library literature since this time reveals few significant articles or books on selecting and acquiring software for public access. The literature that does exist falls into several categories. The largest category of material on software are reviews of individual software programs or types of programs. There have also been a considerable number of articles and chapters both in the library literature and the educational technology literature on evaluating software and selection criteria. These articles are referred to in the section on evaluation. Other publications on selection provide lists of resources to aid in selection, but many of these are now outdated. Some of the more recent ones are referred to in the section entitled "Sources of Software Information."

However, there is little written which provides a holistic treatment
of this subject. Sheila Intner (1988) provides an excellent overview of major issues and concerns from a management perspective. She raises many useful questions which must be asked by those planning to build a software collection.

Other valuable articles and books are cited throughout this article. However, many selection issues are peculiar to different types of libraries. The following sources are recommended for a more in-depth treatment of issues pertaining respectively to academic, school, and public libraries.

Katherine Chiang and Howard Curtis (1987) of Cornell's Mann Library have authored two chapters in *Public Access Microcomputers in Academic Libraries* which are case studies of the Mann Library, in which the authors discuss, in detail, the framework that the library established for selecting and acquiring computer files. Margaret Johnson's (1990) article in a recent RLG publication, *Computer Files and the Research Library*, provides a broader view of collection management and development. Though Johnson defines computer files to include both data and program files, much of the article focuses on the former. Johnson exhorts research libraries to take the lead in their institutions in computer file collection and management, but notes that if libraries are to assume this role, they must meet various challenges, the greatest and foremost of which is defining the universe of computer files. This is particularly difficult since many computer files are unpublished. Johnson emphasizes the need for coordination both within the library and within the university if computer files are to be successfully integrated into the research university.

Askey (1987), Swigger (1986), and Clyde and Joyce (1985) discuss developing software collections in school library and media centers, where selection decisions are tied closely with curriculum decisions. While neither Askey nor Swigger distinguish between collecting for the library or the classroom, Clyde and Joyce address issues specific to the librarian or media specialist. Judith Askey's chapter on selecting software for school libraries focuses on selecting software to meet specific learning goals, but Swigger cautions against defining a collection by the curriculum only. If software has the potential to revolutionize the curriculum, the content of the library's collection must be broader than that of the curriculum (p. 284).

Patrick Dewey's (1984) publication, *Public Access Microcomputers: A Handbook for Librarians*, not only defines the selection process, but provides examples of appropriate software for public libraries as well as key resources to help librarians find software. Dewey (1990) has recently updated this publication.
DEFINING COMPUTER FILES

A useful first step in developing a collection development policy is to define the types or categories of software the library will or will not collect. This requires a basic understanding of the medium and the possible uses of computer files (Johnson, 1990, p. 4). As Chiang (1987) notes, there are a number of existing taxonomies of software (p. 38). Dewey (1988) lists four categories (business, education, games, and utilities) (p. 65); Intner (1988) defines twelve categories of software by subdividing business; these groupings can further be subdivided by expertise and subject (pp. 9-10). Chiang (1987) and her colleagues at Cornell developed a taxonomy based on library functions (pp. 38-47). While these approaches may be useful in some contexts to adequately encompass all types of computer files, it seems that a somewhat different tact is needed. Electronic resources can be defined or classified by three parameters—function, their format, and the mode of publication and/or distribution.

Functional Categories of Software

Broadly speaking, electronic resources can be divided up between software programs and data files. Within both these categories there are many different subcategories.

Software Programs. These are programs or procedures which operate the hardware and manipulate data and include operating systems, programming languages (assemblers, compilers, interpreters), utilities, applications and subroutine libraries. Generally, libraries have been and continue to collect the following types of applications (including subroutine libraries and programming tools):

Personal Productivity—This is certainly the best known type of software. Sometimes called business software, the usefulness of these applications goes well beyond their use in business contexts. Generally, these programs are used to enhance personal productivity. This category includes products like word processing programs, spreadsheets, database management systems, and communications software. Other types of software include graphics packages, outliners, presentation packages, equation solvers, page layout programs, or mailing label production packages.

Professional Software—These are programs that are specific to particular professions such as accounting programs, real estate programs, architectural CAD packages, and engineering programs.

Courseware—This software is developed specifically for use in instruction including drill and practice, simulation, and modeling programs. It includes traditional computer-assisted instruction
programs as well as innovations using hypermedia. Software used in grades K-12 is substantially different from that used in higher education. The K-12 market is more mature and the curriculum better defined. This category also includes training materials used in corporations and the military.

Research Applications—These programs may include data gathering software, statistical analysis tools, sophisticated numeric and mathematical programs, and modeling programs. This software is largely found in university or corporate environments.

Entertainment Software—High and low resolution graphics and textual programs including arcade type games as well as more educationally focused programs are typical of this genre.

Programming Tools and Languages—This type of software is used to create programs. The category includes compilers like C and Fortran, interpreter like LISP and BASIC, authoring languages, authoring systems, and programs like HyperCard (although this type of program also falls into the personal productivity category).

The lines between these functional categories are difficult to draw. For example, a tool used by one person for research or in their profession could be used by another for teaching.

Data Files. Software programs manipulate information or provide information—they perform a function. But data files contain information and hence are much more like other types of library materials. The information in data files can be structured or unstructured; it can be textual, numeric, graphic (still or animated), or sound. Some data files are sold with a software program which allows the user to access, manipulate, and retrieve the data. The categories listed below are based on traditional classes of library materials with which librarians have long been familiar.

Bibliographic Data Files—These may be databases on CD-ROM, disk, or tape. Libraries can develop or acquire bibliographies, indexes to library collections such as songs, newspapers, local documents, or other special collections in machine-readable format.

Reference Sources—This group of files is growing at a rapid rate and includes full text of encyclopedias, dictionaries, statistical compendia, etc.

Secondary Sources—Electronic journals are just beginning to emerge as a new type of publication. The electronic journal has evolved along several distinct paths. Some journals have evolved from edited online bulletin boards; others were conceived of as electronic versions of existing print journals; still others look and behave like print
journals but are available only in machine-readable form. Although many books are produced from digital copy, publishers are only starting to experiment with electronic distribution. Though one cannot curl up with a computer-based book in bed, the Japanese are moving ahead in this area and the United States will probably soon see similar products. Already a consortium of universities and Xerox is experimenting with local publication (using a laser printer) of materials stored elsewhere, and such technology holds much promise for libraries facing future space shortages.

Primary Sources—Collections of literary texts such as the Oxford English Text Archives and efforts to develop an archive for texts in the humanities in this country have received some recognition. But many literary texts have been translated into digital form by individuals and are not published as such.

Data collections, which may be numeric, like census data, or economic data, or textual like genetic or meteorological databases, are increasingly common in the social and hard sciences.

**Format**

Most of these types of program and data files are available in a multiplicity of formats. One tends to think of software as the “stuff” on floppy disks. It is widely recognized that punched cards and paper tape are defunct technologies, but the ever evolving computer storage technology has left even more recent innovations, such as the microcomputer cartridge and 8 inch disk, molding on library shelves, and the 5 1/4 inch disk will probably soon be obsolete as well. In addition to floppy disks, software and data files are distributed on various compact storage devices including CD-ROM and videodisc. Workstation class machines use a variety of storage devices including cartridge and tape, and mainframes continue to require magnetic tape as a medium for offline storage of data.

All of these technologies can be thought of as “stand alone” and, in selecting and acquiring these materials, the library or other computing facility physically houses these materials. However, electronic resources can also be delivered from sites remote to the library over data and phone lines through networks or via modem/telephone access. Libraries have long been familiar with access to the major bibliographic utilities or commercial database services through networks and modems. But there is a rapidly growing body of other types of information resources which can be accessed remotely. The national and international data/telecommunications infrastructure permits high speed access to gigabytes of data stored virtually anywhere on these networks. The technology to deliver information
electronically to personal computers at home from across the county or across the country is available today. Many research and educational institutions are taking advantage of this infrastructure to begin "publishing" locally created information resources over national networks. Some of these resources are informal in nature, like many online bulletin boards, but other resources are the equivalent of printed published materials. For example, Virginia Polytechnic Institute recently announced the electronic publication of an international journal on hospitality. As the digital library grows, it means that a collection of a library no longer is limited to the physical space of that library. While this type of resource is a boon to libraries who are constantly fighting for space, these resources raise questions about the responsibility of the library for materials outside the library's walls. In this case the selection of materials for use by library patrons may preclude physical acquisition but require that the library catalog these sources so that their patrons are aware of them or, in certain instances, purchase accounts so that patrons can access these resources (Chiang, 1987, pp. 41-42).

**Mode of Publication/Distribution**

The third parameter which characterizes electronic media is the mode of publication or distribution. A wide variety of paths are available to get software from the producer to the user. Since digital formats not only are easy and cheap to reproduce, but also the copy of a program or data file is as good as the original; software does not have to be formally published to be distributed or used. Commercial publication mechanisms for software are roughly similar to those for print—i.e., large publishing houses, smaller specialized publishers, and even alternative presses. Computer files may be published by vendors exclusively dealing in software, by hardware vendors, and by traditional print publishers. A great deal of software, though, is available from noncommercial sources. Some of these publishers—universities, associations, the government, and clearing-houses—use retail strategies, but some use public domain strategies (Seiden, 1988 pp. 2-3).

The computing/hacker culture from which the current software industry developed is based not on a "market economy," but on one in which the free and open exchange of information and software is considered necessary in order to move the "art" forward. Steve Erhmann (1987), technology program officer of Annenberg/CPB, has called this public domain distribution mechanism a "circle of gifts." Eventually the developers who place their software in the public domain receive some other program in return.

When a program is placed in the public domain, the author
relinquishes control over that program by not copyrighting it. Public
domain programs are generally written to satisfy a need of the author
who chooses to share the program with others rather than sell it.
The software may be distributed via user groups, libraries, and
electronic bulletin boards. Shareware or user-supported programs may
also have been written for the personal use of the programmer, but
the author may request donations from users, if the users, after trying
the program, decide to keep it. Some authors are casual about the
process, but others may support their programs full time. In the
case of user-supported software, the users are expected to provide
the authors with suggestions for improvements to the programs. Some
programs are developed to the point where they are equal or better
than similar commercial programs. To encourage payment, some
authors ask users to register. The registration fee guarantees support,
documentation, and updates (Seiden, 1987, pp. 10-11).

The price of these voluntary contributions has increased to the
point where some shareware packages cost as much as their
commercial counterparts. Other software has gone commercial, and
some software collections are being packaged and sold for profit by
third parties. These individuals and organizations add value to the
collection in some way. They may guarantee that the software is
virus proof, or they may offer it in a convenient format (a subscription
based service or a collection on CD-ROM).

Another trend away from public domain distribution is that
authors have begun copyrighting their work to ensure that others
do not make derivative works and market them as their own. Richard
Stahlman's Free Software Foundation was created to develop an
alternative to AT&T's UNIX software. Stahlman does copyright his
programs but only to ensure that no one else will try to sell his
software, and much of his software is considered as good or superior
to commercial products.

The distinction between the market-based and public domain
distribution systems is no longer as clear as it once was. With the
development of shareware and copyrighted shareware, and the advent
of third party publishers of public domain collections, there has been
a gradual blurring of these two systems.

All of the distribution strategies discussed thus far entail some
sort of publication. But there is a good deal of software which never
goes beyond the individual or institution who developed it. Though
some of this may be extremely useful, the incentives for publication
are lacking. Developers may not perceive the rewards of broader
dissemination as worth the effort required to debug and document
their programs to make them available through clearinghouses or
public domain libraries, and commercial publishers may not perceive
The library may choose to act like a publisher for some of these materials by collecting and/or cataloging them and making them available for use either locally or online. The library has a potentially large role to play as publisher of electronic resources created by itself or members of its community.

**The Selection Process**

Katherine Chiang (1987) expresses some reservations in describing the Mann Library's collection policy since the rapidly changing nature of software makes codification of a selection process difficult. But, as she points out, the lack of a policy can result in a collection of software which is wasteful and inefficient (p. 36). Despite the importance of a collection policy, of the seventy-four institutions responding to a 1985 ARL SPEC survey on microcomputer software policies, only 14 percent had a collection or circulation policy in place and another 20 percent were developing one. Only 5 percent had an institution-wide collection development policy (Association of Research Libraries, 1986, pp. 2-3). A survey done by *Choice* confirmed these results. The authors found few policies, and, where they existed, they were usually extensions of current policies rather than wholly separate documents (Dudley, 1986, p. 704).

In developing the selection process and collection policy, a library must decide whether to develop a single policy for all electronic resources or multiple policies for distinct types of resources, or choose to integrate this format into existing subject-oriented collection policies. Despite the variety of resources which one can appropriately consider as software, there is a tendency to lump these information products into one large category for the purposes of collection development.

The reader may argue for the usefulness of establishing a single set of selection criteria for all electronic resources. Yet as more and more materials are made available in digital format, the issue of form versus subject should become a nonissue. It is clear that, in certain cases, the electronic resource resembles print materials and may fit well into existing policies. This is true when dealing with data files, particularly primary or secondary information sources for which no print equivalent exists. In such cases, the overriding consideration will be the subject and scope of the resource. Even where electronic formats are to be integrated into existing policies, the policy authors must pay heed to the format's unique characteristics and address issues like system requirements.

Other categories of electronic resources may not integrate easily into existing policies. A survey of libraries who are acquiring bibliographic data tapes to load on local systems found that fewer
than 5 percent of the schools had collection development policies for electronic resources in place. Nevertheless, decisions about which indexes to purchase in print—CD-ROM or tape formats—are some of the most critical that are being made in libraries today and require policies which provide guidance in selecting format as well as subject.

Another area which clearly demands its own collection policy is software programs. Although one could argue whether educational software policies might more appropriately be incorporated into existing policies for particular subject areas, personal productivity and research tools do demand separate policies since these are functional (tools) rather than informational products and represent a new category of material for libraries.

Whether or not the library chooses to integrate computer files into existing policies or to develop a separate collection policy, elaborating selection criterion in a formal manner ensures that the library will undertake development of the collection in a coherent and systematic fashion. Examples of some academic library collection policies can be found in ARL SPEC Kit 123, Microcomputer Software Policies in ARL Libraries (Nollan, 1986).

Who are the Selectors?

In establishing collection policies for electronic resources, the library must take into consideration not only the selection criteria, but also who will be making the decisions. Where the collection development strategy is based on form rather than function/subject, the tendency may be to assign one person the responsibility for making all collection decisions involving software. Assignment of responsibility may well vary with the type of library and even within the same type of library. In small libraries, such as school libraries or small public libraries, all staff may contribute to decision-making (Dewey, 1984, p. 36). In some cases, administrators or reference staff may have selection responsibility or perhaps one staff who will be assigned and who has experience with microcomputers (Hannigan, 1985, p. 340). But in larger libraries, particularly in academic libraries, one of two models prevails—assignment of responsibility to collection development staff or assignment of responsibility to a microcomputer or software specialist. In the first model, attendant administrative and public service responsibilities usually reside elsewhere; in the second, the person who is responsible for selection is usually in a unit responsible for managing public access microcomputer services.

In libraries collecting software for teaching and research, requisite subject expertise in selecting programs as well as data files may mean that collection development is done by subject specialists. This is the case at the University of Florida (Beaubien, 1988, p. 667) as well
as at a number of other ARL libraries whose policies are included in this SPEC kit (Nollan, 1986).

On the other hand, at Cornell the need for computer expertise was the overriding factor in the Mann Library's decision to let all software selection rest with either the computer data files librarian or computer projects coordinator. It was hoped that within two or three years appropriate skills would be found among staff to facilitate moving the selection of computer files to subject specialists (Chiang & Curtis, 1987, p. 49). Many times these positions are newly created and these people often have not only collection responsibilities, but support and training responsibilities as well. In this model, faculty often play a major role in the selection of software (Dudley, 1986, p. 704) or subject experts are consulted or asked to make suggestions so that subject knowledge is available to the primary selector.

Carnegie Mellon created two positions, one responsible for software programs and one responsible for statistical and bibliographic data files. Eventually, these two functional responsibilities were reintegrated into other parts of the organization. This pattern of creating new positions and then integrating their functions into existing positions after a certain time allows the library to give new services the attention and visibility they need to be successful during the initial period of rapid growth. Those positions (lines) can then be used for other new services as needed.

As libraries gain greater familiarity with computer files, the responsibility for building collections of software will probably evolve to a hybrid model wherein subject experts may be responsible for some types of software (for example, courseware and subject data files) while a microcomputer specialist may select personal productivity software, and the head of reference or some committee of public service and systems staff may be responsible for the selection of bibliographic files.

Whether the final decision to purchase a single piece of software or data file resides with one person, or with different librarians throughout an institution, it is recommended that the collection policy be developed by a committee representing various interests (public service, systems, and collections) in the library. If responsibility for collection is to be dispersed among various staff members, Intner (1988) recommends some administrative coordination (perhaps by the head of collection development) to ensure a coherent collection and to minimize duplication of purchases (p. 13).

The main reason that libraries choose to create new positions for software or data file specialists is because this type of library service requires special skills. Hannigan (1985) surveyed libraries to identify priorities for staff development related to public access
microcomputing and found that, despite the fact that librarians may need new skills to enable them to select and evaluate software, few libraries are concerned with developing these skills in their staff. Hannigan addresses the critical need for staff development programs to develop competencies in selecting and evaluating software. She identified the following types of skills as necessary for selecting software: (1) fundamental skills in using microcomputers; (2) ability to recognize a program's objectives and match those with the library's objectives; (3) ability to read and analyze computer documentation; (4) ability to recognize errors and false information; (5) knowledge of a wide range of programs within a generic type (e.g., word processing programs); (6) recognition of the value of electronic communication and networks; and (7) ability to compare and contrast programs with similar objectives (p. 341). Johnson (1990) would add to this list an in-depth knowledge of the universe of computer files and how to locate them (p. 5).

Some of the skills which librarians need are technical, although the extent to which one requires computer expertise in the selection of materials will vary with the type of software and whether or not the selector must fully evaluate some of the software before purchasing it. The selector should at least have the knowledge to allow matching system requirements with available hardware. If the selector will also be supporting the software, then technical knowledge is critical. But developing good evaluative and critical thinking skills is equally important.

Rappaport (1985) suggests that the best way for librarians to develop computer skills and "discriminating, critical skills" is for the computer to become a routine part of the library and for staff to have time to "play with the computer." Once librarians begin using computing for their own productivity, they can take the next step into public access computing and help with the ongoing development of such services (p. 57).

Money, Money, Money

Software is expensive—not all software, but many of the popular packages are costly. Where will this money come from? Should a separate budget line be established? Budgeting will depend on whether a library chooses to have a single acquisition strategy for all electronic resources or whether collection policies are integrated into certain subject areas.

Casey Green, a researcher with USC's Center for Scholarly Information, has likened computing costs to a four legged stool encompassing hardware, software, support, and amortization/maintenance. Most institutions have only focused on hardware since
this was the largest single cost. In fact, many academic libraries who received hardware as part of a grant may have overlooked the substantial costs of providing software and support. Rappaport (1985) notes that "a librarian...told me they didn't even have any background information on the selection of their original collection of software because it came as a gift along with the hardware. Now they add software as they get extra money" (p. 57). Initial investment alone is insufficient if the library is to have a viable collection.

Because of the substantial initial investment, a library beginning to acquire software might want to use capital funds (equipment budget, for example) to purchase a start-up collection. Then additions to the collection and new versions of older software would be funded from operational costs or the materials/book budget. Another model used by the Academic Computing Department at Carnegie Mellon funds all new purchases from the capital budget and new versions and maintenance agreements/contracts out of operational/annual monies.

Software maintenance is a real cost that cannot be overlooked. Most hardware is obsolete within five years, and the software technology is changing even more quickly. A library may not need to have the latest in word processors, but neither does it want to provide tools which are considerably out of date. Any annual software budget will have to include funds for updates. Depending upon the scope of the collection, maintenance funds might be as much as 50 percent of the total budget. In fact, some software may be financially more like a serial than a book or other one-time purchase.

If the acquisition of software is going to be handled by subject specialists, then the library might do well to establish a separate budget line which can then be subdivided among the selectors. But such allocations require new algorithms for estimating costs. Unlike printed materials, software in the humanities and social sciences is not necessarily less expensive than its counterpart in the sciences. A good textual analysis program is likely to cost just as much or more than an equation analysis package.

One other possibility for funding purchases of electronic materials in academic libraries is cost sharing with academic departments or with the computing center where software under consideration has, respectively, a very narrow or very broad appeal. Cost sharing can entail considerable negotiation and politicking. In some cases, academic departments have already been collecting these materials for their faculty and students and may be reluctant to change the status quo at the risk of disenfranchising or inconveniencing faculty and students. Computer centers may wonder why the library is providing information in a format over which they have ultimate
control. The library has much to offer as a manager of these disparate resources but must avoid being perceived as usurping departmental authority. If the library takes the lead in coordinating purchase of these resources, not only is unnecessary duplication of resources avoided, but the library ensures that it remains a central source of information about what is available and how to obtain it (Johnson, 1990, p. 4).

**Selection Criteria and Collection Policy**

In developing selection criteria, the first thing to be defined is the scope of the collection. The scope or purpose of the collection is, to a great degree, dependent upon the type of library. For example, school libraries usually collect what could be termed courseware and probably also collect basic word processors and programming languages. Patrick Dewey (1984) lists several areas in which public libraries should collect software including computer literacy, programming languages, computer-assisted instruction, special interest programs like software for tax preparation or recipe doubling, library skills programs, personal productivity programs, software for children which can be useful for preschoolers as well as to supplement the local elementary school curriculum, and entertainment software (pp. 31-35).

The scope of the software collection in an academic library eludes such simple definition. In academic libraries, the reasons for collecting software programs are not always clear. Because software programs are functional (tools), libraries may have difficulty viewing them as an extension of the print collection—as a collection to support the research and teaching mission of the university—since the print collection is largely informational in nature. Libraries may feel most comfortable with a collection policy similar to Cornell’s Mann Library which fits most closely with the library’s traditional role as liaison between the information and the client. Cornell’s collection is primarily one of data files and applications programs which are used to access, control, and analyze information (Chiang, 1987, p. 39). Other libraries may see no reason to limit the scope of the collection to traditional services.

The scope and purpose of the academic library’s collection is generally not determined in a vacuum. Given the cost of these resources, the last thing the library wants is to duplicate a service being provided elsewhere on campus. Before embarking on a project to establish a software collection, every library needs to study the computing environment of the college and university. What role does the computing center play in support of public access microcomputing? What role do departments play? Are there any unserved or
underserved populations?

The public access microcomputer service or software collection is going to be shaped by the larger institutional environment. That is why Dudley (1986) found, in her survey for Choice, that software collections of academic libraries, some of which are traditional and some of which are completely new types of services, serve "a plurality of needs" (p. 704). In some institutions the library may be the only place providing software for public use, or its microcomputer facility may be one of a few facilities on campus. In these cases, the library may collect generic applications software like word processors. In other institutions, the computing center may fulfill this role, and the library's collection may be geared to meeting other needs.

While Dudley (1986) found that the majority of academic libraries are developing collections which contain mostly productivity software, some collections fulfill a reserve function and house only software used by faculty in direct support of their courses. Still others collect basic skills software or materials developed in house. Education libraries tend to collect K-12 software, often deposited by the producers. Despite the wide variety of models that the Choice survey found, few academic libraries are building a general instructional software collection to support both the curriculum and independent study—the central role of most academic print collections (p. 704).

There are a number of other issues that libraries must address in their collection policies that are unique to software. Should the library standardize on certain applications? Should the library purchase multiple copies of software? Should the library purchase only from selected publishers? Should the library acquire public domain software or locally developed software? Should the library maintain multiple versions of the software? What formats should the library collect? What hardware will the library support?

In determining the scope of the collection, the library must also decide whether to "standardize" on one or two packages in different application areas or to provide users with a variety of software. The former approach has the advantage of developing a considerable base of expertise but has the disadvantage of censoring the collection and dictating to the library patron which package best meets their needs.

Dewey (1984) states that variety is the overriding principle in selecting software for a public library collection—different kinds of software should address different ages, educational level, and interests. The goal of the collection should not be exhaustiveness but rather a selection of good programs. In some areas—such as entertainment—the library may want to collect a number of programs, in others—e.g., database management programs—one title may suffice
(pp. 30-31).

If a library chooses to standardize, it will probably also purchase multiple copies of the standard packages. If a library maintains a public computing facility which is used by its clients for word processing, then it must purchase multiple copies of the software. In other cases, the purchase of more than one copy of a program will be dictated by demand. If software, with the exception of courseware, is going to be used in teaching, then it is often possible to negotiate with producers for permission to use one copy for the entire class.

At the time that a library develops a collection policy, the staff should also consider whether the library will only collect commercially published software or also consider public domain or locally developed software. In order to provide a greater variety of software, many public and academic libraries acquire public domain collections. Purchasing public domain software also allows the library to freely circulate the software without fear of piracy. A library may also decide that one of its functions should be as an archive of locally developed software which faculty have created to support their research or teaching.

A library must determine if it will maintain old versions of software it collects. While libraries don't usually discard earlier versions of printed materials, taking on an archival role for even locally developed materials may be beyond the capability or desires of the library. Although most program files are upwardly compatible, data files are not. That is, a report or article might be based on a data file that was subsequently revised. If all libraries chose to discard that file, then no record of the researcher's primary data would exist. It is critical that both individual libraries and the profession address this issue sooner rather than later. (In 1990, Columbia University's School of Library and Information Science sponsored a brainstorming session on the development of a microcomputer software archive. Although, the primary purpose of the archive was viewed by most participants as historical in nature, there was strong interest voiced in some type of comprehensive archive which could be used for patent research and would ensure that programs existed somewhere which would be able to read data files that current software was unable to read.)

Libraries must also determine the formats which they will collect. Many libraries only support microcomputer formats, while others may collect materials which will physically reside outside the libraries (e.g., data tapes may be housed in the computer center). Libraries may want to consider to what extent they will be responsible for collecting online data or software outside the physical library.
Libraries can provide access to this material through telecommunications links, cataloging, and some level of support.

In addition to determining the scope of the collection and the type of materials to be collected, the library will want to determine what hardware and operating systems it will support. In an ideal world, a library should make decisions about what software to acquire independent of and before any hardware decisions are made. The library would assess the needs of its clients, find suitable software, and then purchase the hardware to support it. But few libraries, if any, let software decisions drive hardware purchases; in almost every instance the reverse is true. If the software will be used outside the library, the library's own machines become less important in decision-making, though the library may still choose to support only those hardware environments which they own so that making back-up copies, providing support, or evaluating products is feasible. If the library is part of a larger organization (university, school district, or corporation) it will want to collect software which is compatible with the hardware environment supported by the host institution.

EVALUATION OF COMPUTER FILES

The question of what constitutes an appropriate evaluation of software is dependent upon the type of software being collected and the purpose to which it will be applied. Evaluation can be accomplished in various ways. Libraries can acquire software which has a thirty day return and perform a complete hands-on evaluation. School librarians often have access to regional evaluation centers. Software is regularly exhibited at trade shows affiliated with conferences, such as EDUCOM, MacWorld, NECC, though little is marketed at ALA. Local computer stores are often useful for evaluating generic applications software. There are published reviews and, last but not least, librarians can talk to users of the software or local user groups or other experts (Dewey, 1988, pp. 66-67).

The time spent on evaluation must justify the use and cost of the software. If the library is making institution-wide decisions and recommending the "standard software" to be used throughout the institution, then hands-on evaluation and considerable testing of competing products is useful. An expensive software package may seem to require substantial hands-on evaluation while less expensive products may merit less attention.

Sometimes reading published reviews or descriptions may be sufficient. However, most reviews are not written with a library audience in mind. Patrick Dewey's (1988) chapter in The Library Microcomputer Environment provides a useful review of published software reviews. The article covers the anatomy of a review and
gives some caveats about the review literature. It is clear from Dewey’s article that selecting software is not yet as simple as selecting a book, but with a certain amount of skepticism and a grain or two of salt, librarians can rely upon published reviews.

At some point, when there is no published information about a software package or information about how the library intends to use it, a library may need to undertake software evaluation. There is a huge volume of material published on software evaluation particularly as it pertains to educational software. There are many published “guides” or forms to help professional evaluators and software purchasers evaluate software. Most guides are geared towards evaluating software used in an educational context. Jones and Vaughan’s 1983 publication, Guide to Guides, and a recent article by Schueckeler and Shuell (1989), provide a comparative survey of some of these guides and evaluation forms. Since most of the evaluation guidelines are geared to K-12 educational software in the classroom environment, several librarians have developed short lists of criteria which may be more appropriate to the library environment. Clyde and Joyce (1985) present three sets of evaluation criteria for the school library: (1) general, (2) criteria for library management software, and (3) criteria for educational software. Troutner (1989) gives guidelines for evaluating three types of educational software. Cargill (1987) provides guidelines for different types of productivity software (word processing, communications, and spreadsheets) as well as some general criteria. Dewey (1984) also provides a useful list for the public librarian who may be purchasing productivity, entertainment, or educational software.

The criteria established by these authors are unique to computer files and to programs in particular. Margaret Johnson (1990) takes a different approach when she analyzes eight general criteria used at Columbia in making collection decisions regardless of format and applies them to computer files. These eight are: (1) relevance of material to program needs, (2) scope of treatment, (3) ability to fill existing gaps, (4) quality of scholarship, (5) currency of information, (6) accessibility of information, (7) language, and (8) cost (pp. 7-9). Johnson’s article is particularly useful since it does not focus exclusively on programs, but can be applied more generally to all types of computer files.

None of these lists, with the possible exception of the Clyde and Joyce article, are definitive, but they may be useful as a starting point. One set of evaluation criteria for one type of software cannot always be easily transferred to another type of software. Chiang and Curtis (1987) suggest that one might develop one’s own guidelines for certain genres or subject areas of software. But this task is by
no means simple, and it requires a high degree of familiarity with the genre. Sometimes comparative reviews give a description of what a program should do and how programs measure up to that standard. If no descriptive standard exists, the selector might develop his/her own by examining individual reviews. But if no published reviews exist, the selector will have to create their own standard (p. 54). Such standards are only useful for comparative reviews. Many software programs, especially those used in higher education, are unique. They often derive from a faculty member's syllabus and are as personal as lecture notes, or they may fulfill a need which had hitherto gone unmet. Applying general collection guidelines, such as the Columbia criteria, may be particularly useful in such situations.

The evaluation of any program can be divided into four areas: technical evaluation, design, content, and support. Librarians should concern themselves with the following aspects of each of these.

**Technical Concerns**

Technical evaluation encompasses hardware and operating system compatibility and the reliability of the software (is it bug free, does it run efficiently, does it work as advertised?). If software is going to be used in the library only, then hardware compatibility is critical. As hardware has become more complex, the system requirements for any individual piece of software must be carefully scrutinized. Obviously, machine compatibility is critical, but software may also require certain graphics functionality (a particular card or monitor); it may require so much internal memory or so much disk space. Data files may only be compatible with certain data formats or software programs. Few personal productivity packages can be run from a floppy disk anymore; they must be loaded onto a hard disk and this may have implications for machine maintenance and licensing. A library may need to determine if software can be placed on a network (legally and technically) so that multiple users can have simultaneous access.

Libraries will want to collect software and data files for which there is some quality insurance—though this is not always possible. Just as libraries judge the quality of print materials by their publisher, software selectors should be able to do the same for electronic resources. However, even commercial programs are regularly released with bugs to say nothing about public domain software. Viruses which are introduced intentionally into software are also cause for concern. Although there has been, at least, one scandal wherein a commercial software package was released with a virus, the most susceptible sources are public domain bulletin boards. Many user groups and software libraries such as Compuserve's and Boston
Computer Society guarantee programs which are virus free, but then
the user must pay for this benefit. Data files should be evaluated
for data integrity and validity. The problem of quality assurance
is even more difficult with unpublished software. Some clearing-
houses which distribute this type of software provide no guarantee
of quality—either technical or content; others have some peer review
process. The InterUniversity Consortium for Political and Social
Research (ICPSR) ranks its data files from one to four based on their
quality, but the ICPSR is the exception rather than the rule. Since
the integrity of data can be so easily compromised in the electronic
environment, librarians will be called upon to become adept in
recognizing reliable and quality sources of computer files.

The type of software determines the other specific characteristics
that should be tested. Performance evaluation and benchmark testing
are common with generic applications software. The speed of sorting
or maximum size of a record are critical in evaluating database
management systems but irrelevant to evaluating a drill-and-practice
program.

Software Design

Software design encompasses areas such as screen design, menu
design/branching, integration of graphics or sound, how effectively
the software makes use of hardware, and how it interacts with the
user. Graphics are evaluated for aesthetic value, appropriateness, and
technical quality; textual materials must be examined for accuracy,
readability, and motivational quality. The program needs to be
examined for ease of use or ease of learning for its intended audience
and how these factors are balanced by functionality. To those practiced
in evaluating other media (particularly school librarians and media
specialists), much of the design evaluation process will seem familiar,
but the interplay among the components is new (Swigger, 1986, p.
285).

Content

The content of a program should be evaluated by what the
program does and how effectively it meets the user's objectives.
Johnson (1990) notes that determining the relevance of a computer
file is a skill new to most selectors and bibliographers. It requires
familiarity with the published and unpublished "universe of
computer files." In the academic environment, it may also mean
knowing what faculty and students are already using, what has been
locally developed, or what has been acquired by departments (p. 7).

It also means that the selector must know how the computer
file will be used. While it may be fairly straightforward to assess
the content of a data file, a word processor, or numerical analysis
program in certain contexts (such as in business), many more
questions are raised when that word processor, numerical analysis
program, or data file are to be used in educational contexts. It is
difficult to anticipate how a particular piece of software may be used.
While one person may use a spreadsheet to do budget analysis, another
one may use it to create tables to insert into a text document, and
another may use it in classes to illustrate certain civil engineering
problems. Because a single piece of software can be used in so many
ways, one cannot rely on product summaries to determine content.
Research in areas as widely disparate as discourse analysis and
information retrieval have not yet provided reliable techniques for
determining content (Swigger, 1986, p. 288).

The evaluation of information technologies and their impact
on learning is a continuing source of debate among those who create
and use computing in teaching. As Swigger points out, the problem
with many of the current evaluation guidelines is that “they assume
the important characteristics of [software] in terms of learning
consequences are known” (p. 291).

Content of courseware and games should also be examined for
offensive material. Issues dealing with equity oriented guidelines for
the selection of software are addressed by Patricia Campbell (1986).

Support

In addition to the software's characteristics, one should also
evaluate the quality of documentation (online and printed); tutorials,
and other supporting products to help in learning a program, and
vendor support services such as hotlines, update policies, and costs;
warranties and return policies. Last, the benefits and quality of a
data file or program must be weighed against local support issues—
that is, the financial, personnel, and physical constraints of the library.

Sources of Software Information

It is frequently difficult to find even the most basic level of
information about some software. That is because software eludes
traditional bibliographic control mechanisms which help libraries
identify and gain access to materials. One reason that software defies
control is because the avenues of distribution are many and they
include many avenues outside the normal publishing infrastructure
(see the section entitled Mode of Publication/Distribution). Second,
the software publishing industry is highly volatile.

In the year following the publication of the Directory of Software
Sources for Higher Education, it is estimated that 50 percent of the
commercial sources of software listed were no longer publishing and/
SEIDEN/SELECTION OF SOFTWARE FOR PATRON USE IN LIBRARIES

or distributing software. The reasons for this turnover are many. Much commercial software production is a cottage industry with small mom and pop shops dotting the countryside, and these "family businesses" are born and die with amazing rapidity. Many traditional publishing houses who entered into the software publishing industry at the onset of the microcomputer revolution eventually dropped out for lack of market share. The late 1980s witnessed a major shakedown in the software publishing industry as a whole with many smaller entrepreneurial shops being taken over by larger software companies.

In part, due to this volatility, the efforts to provide efficient indexes to this body of material has been equally scattered and volatile. While the mid-1980s saw an explosion in the number and variety of sources which sought to describe and evaluate software, many of these efforts were one time publications that were soon out of date. (In the last two years, both the ICP Directory of Software, one of the most comprehensive directories of mainframe and minicomputer software, and Elsevier's Software Catalog ceased publication. MENU Publishing, who maintains the database from which the Software Catalog is derived, says that they will continue maintaining the database for the time being. Software Reports, an evaluation service for K-12 software, has also ceased publication.) There are some standard sources emerging for the more common types of applications software, but many other types of computer files remain undocumented. As the body of electronically published data seems to increase logarithmically, the problems of bibliographic control of this material reaches crisis proportions.

Types of Software Information

The software selector may require up to three levels of information about a particular program in order to make an informed decision. At the most basic level the selector needs to be able to locate a program to match his client's needs. At this level, he/she may only need some sort of description of the program. This description must include a complete statement of system requirements as well as a description of the program's capabilities or scope. If several programs exist, the selector may need to find out which is the best program. One requires evaluative information to be able to make this decision. But even when not selecting among programs, the detail of a good evaluation may be necessary to decide whether the software should be acquired. The type and depth of printed evaluations can differ substantially from source to source. For example, some sources of software are selected lists of the best software in a particular area (e.g., the EDUCOM/NCRPTAL Awards catalog), but the actual evaluative information that they publish is minimal. Others simply
rate programs, and some sources contain in-depth evaluations. As Dewey (1988) points out, spoken reviews (verbal or electronic) from users of the program or user groups are particularly helpful (p. 67). Lastly, the selector may need use information to understand how the software might be applied to a user's needs. This anecdotal information can help address uses of software that the publisher may not have anticipated.

The amount and type of information to be found about any one type of software varies significantly. While personal productivity tools, CAI for K-12, and commercial bibliographic data files are relatively well indexed, and there is a significant amount of evaluative information about the commercially published materials, information about certain data files or research software or software for higher education can be more difficult, if not impossible, to find. So much of this information is still communicated informally—word of mouth, conferences, or online bulletin boards.

**Resources**

The number and variety of software information sources is overwhelming (see Appendix). Many different directories exist to help the selector do retrospective collection development and hundreds of journals, magazines, newsletters, and electronic bulletin boards exist to help keep selectors current. Some of the sources are horizontal, covering broad genres of software or software for particular machines, and some are vertical, covering specific subject areas.

In order to help software selectors find some of the more obscure indexes to software, librarians have written several guides to software resources. The most recent and most comprehensive is Carol Truett's *Microcomputer Software Sources*. This unique source contains eight sections which provide descriptive and/or evaluative annotations on comprehensive software sources, business software sources (this section is divided into eleven chapters covering different vertical markets such as agriculture, law, medicine, retail trade, design and engineering, and science and technology), educational software sources, library applications, machine-specific software sources, and public domain software. It also has a section which serves as an introduction to the literature of computing.

The author's *Directory of Software Sources for Higher Education* is a similar resource listing commercial and noncommercial sources for software programs and data files developed specifically for research and teaching in higher education, as well as catalogs and databases of software, published bibliographies of software, journals, review sources, and organizations which are either developing software or collecting information about software. Though the focus of this
directory is information about software used in higher education, the scope of these sources is broad enough to be useful to any library. Softlnfo, a database sponsored by IBM, developed by the University of Bridgeport, and available through the ISAAC system at the University of Washington (bitnet and internet accessible), provides information on a wide variety of resources (databases, journals, print catalogs, and organizations) which are sources for information on IBM software. Truett's book should be the first stop for anyone looking for software programs in an area with which they are unfamiliar and should be in every library which collects software.

SOFTWARE PROGRAMS

Equally important are a number of directories purporting to be the "Books in Print" for software. Some focus exclusively on microcomputer software such as Bowker's Software Encyclopedia or the Datapro Directory of Microcomputer Software. Elsevier's Software Catalog (also published on Dialog), is available in six editions: microcomputers, minicomputers, business software, science and engineering, health professions, and systems software. Datapro does publish a software directory covering larger machines, but the cost may be prohibitive to smaller libraries. Those seeking software for larger machines may wish to consult directories published by hardware vendors.

There are many directories which only cover software for certain machines. DEC has a catalog for third party commercial software which runs on its Ultrix operating system; Sun's Catalyst catalog lists third party software research and education. Most other mainframe and minicomputer/workstation vendors have similar catalogs of software.

Much software for larger machines and for research is developed by federal agencies and their contractors, and there are several directories of software available from the government including the Directory of Computer Software from NTIS and the COSMIC Catalog which lists software from the COSMIC clearinghouse at the University of Georgia, a distributor of programs from NASA. Other directories are limited to certain types of software such as T.E.S.S., The Educational Software Selector, or to even more specialized subject areas (e.g., the CALICO database which lists software for computer-assisted language learning). The problem with many smaller directories is that they are updated infrequently if at all. There are a significant number of sources in Truett's directory which have not been published since 1984.

There are hundreds of journals to help the software selector keep abreast of developments in the software market, not only through
product announcements and reviews but through ads. Some of these are general such as *Byte* and *InfoWorld*, but many are specific to certain machines, such as *PC Magazine* or *PC World* for IBM and compatibles software, *MacUser* and *MacWorld* for Macintosh software, *A+* or *Incider* for Apples, *Ahoy* for Commodores, and most recently *NeXTWorld* for NeXT machines. Subject specialists doing software selection may want to scan the advertisements and product announcements in computing publications in their particular area, such as *CIME: Computers in Mechanical Engineering*, or in subject specific journals covering technology, such as *Analytical Chemistry* or *Civil Engineering*.

**Data Files**

There is a dearth of information about data files with the exception of bibliographic data files. The most comprehensive sources are *Computer-readable Databases* and *The Data Base Directory*. Cuadra Associates, who has published its *Directory of Online Data Bases* since 1979, recently began issuing the *Directory of Portable Databases* which covers CD-ROM products. The standard source for CD-ROMs is Meckler's *CD-ROMs in Print*. Updates appear in *CD-ROM Librarian*. Sources of government data files include *A Directory of Computerized Data Files: A Guide to U.S. Government Information in Machine-Readable Form* from NTIS, *Federal Statistical Data Bases* from Oryx, the *Federal Data Base Finder* and the *State Data and Database Finder*, both from Information USA. Files produced by individuals elude any sort of bibliographic control unless they are deposited with a clearinghouse like the Interuniversity Consortium for Political and Social Research.

Since many electronic resources are becoming available over Internet and other national networks, there have been some efforts made to catalog these resources. Both *Internet Resource Guide* and Art St. George's *Catalog of Internet Accessible Library Catalogs and Databases* are limited but useful introductions to the scope of resources available on that network.

**Public Domain Directories**

Sources of information about public domain software are less than current. Most of the directories listed in Truett's book and in Fred Sissine's 1988 article were published prior to 1984. Glossbrenner's *Master Guide to Free Software for IBM's and Compatible Computers*, 1989, does include a core collection of software, but most importantly tells users how to locate this software. Once users are familiar with how to access the major public domain archives, lists of the archive's current contents can be obtained. Glossbrenner's 1984 book, though
out of date, provides similar information for "every brand of personal and home computer." Some user groups, such as the PC-SIG group and Boston Computer Society, publish print catalogs of their software archives.

**Evaluative Information**

There are a few compendia of software reviews which attempt to be comprehensive in scope; most are quite expensive. Half of the *Datapro Reports on Microcomputers*, a looseleaf service, is devoted to software. These are comparative reviews which include overview charts of all software packages examined and in-depth evaluations (twelve to fourteen pages in length) of selected packages and are limited to courseware. *Software Digest Ratings Report* and the *Software Digest Macintosh Ratings Report* are published ten times per year and cover one type of package per issue. *Software Reviews on File* is like *Book Review Digest*. For each package covered, it includes the publisher's description and one or more excerpts from published articles that review the product.

Software for K-12 has benefited from a well-developed curricular evaluation process. Consortia and various state and regional clearinghouses have been established to review courseware. While some of the sources attempt to be comprehensive, such as *EPIE PRO/FILES*, others only list a select number of programs in an effort to help guide teachers and librarians to the best applications like *Only the Best: The Discriminating Software Guide for Preschool-Grade 12* and the *Educational Software Preview Guide*. Comprehensive evaluation sources include *RICE: Resources in Computer Education*, a database compiled by the Northwest Regional Education Laboratory from its MicroSIFT evaluations, *EPIE Micro-Courseware PRO/FILES*, an annual publication with bi-monthly updates that provides comprehensive evaluations of over 500 packages. (MicroSIFT no longer publishes individual reviews of software, but NWREL continues its evaluation activities through publication of Courseware Evaluation Reports. These reports are an analysis and synthesis of available evaluation data that focus on specific areas of microcomputer use. These reports are added to the RICE database.)

The best sources for reviews of software, other than K-12 programs, are to be found in the journal literature. Many of the machine specific journals, like *MacWorld* or *PC World*, will do extensive product comparisons. As noted earlier, there are many discipline specific computing journals which include software reviews. Furthermore, many professional, scholarly, and teaching journals are beginning to include software reviews just as they include book reviews. For example, *French Review* and *Hispania* carry reviews
of French and Spanish software respectively and the *Journal of Nutrition Education* covers nutrition software. *Choice* is a useful source of reviews of not only software programs appropriate for academic libraries, but also of data files and online databases. The reviews in *Booklist*, like *Choice*, are from a library perspective, however neither source does a comprehensive review. The focus of the reviews is more on content than on technical aspects. *Library Software Review* provides more extensive reviews, but most of the reviews are geared toward library applications rather than public access applications. Again, one will find that any evaluative information on nonbibliographic data files is virtually nonexistent.

To locate these reviews, selectors can use one of several online databases or printed indexes which cover computing literature including the *Microcomputer Index*, the *Computer Database*, or *The Computer Literature Index*. *ERIC* or *CIJE* cover all of the teaching journals and some of the scholarly journals which publish software reviews. Selectors should also search relevant databases which cover literature for specific subject areas like *Compendex/Engineering Index*.

*Software Use Information*

Unfortunately, it is impossible to find any sort of directory of how people are using software. Vendors sometimes attempt to gather this type of information. For instance, Apple Higher Education has been developing a database of uses of Macintosh technology in higher education which does include how various Macintosh third party applications are being used, and companies like Ashton-Tate, Microsoft, and Addison-Wesley include anecdotes in their newsletters concerning how people are using their software. One can also search for such information in "how we did it good" type articles in the education and library literature. But most of use information is communicated much more informally—by word of mouth, face to face, or via electronic bulletin boards. Local user groups may be helpful in locating someone familiar with a particular application, and vendors sometimes will provide referrals.

*The Limits of Printed Finding Tools*

The software selector may quickly reach the limits of usefulness of printed sources. Knowledge of unpublished files is usually limited to their creators and other insiders. How does the librarian become an insider? Johnson (1990) suggests reading the literature of the discipline for references to computer files, networking not only with other librarians who collect computer files but also with other professionals through discipline-based scholarly associations, and
outreach to faculty who produce or use these files (p. 6). The electronic environment with access to online bulletin boards such as PACS-L (public access catalogs) or the Humanist ListServ (applications of computers in the humanities) can facilitate such networking and information exchange.

**ACQUIRING SOFTWARE**

Acquisition of software often requires different procedures than acquisition of other types of library materials. It requires the acquisition's staff to find sources of the requested computer file and then find the best price. Though a certain percentage of published software programs may be procured through library jobbers, jobbers handle only a small percentage of available software titles. The library may be forced to deal directly with producers of computer files or other distributors, and often this entails some degree of negotiation. There is little need for negotiated agreements for off-the-shelf software programs and CD-ROM databases when one is purchasing single copies. However, the library may find itself negotiating software purchase agreements with vendors when purchasing multiple copies, developing institution-wide purchase agreements, or seeking permissions not granted in the license (e.g., classroom use or network use).

Even when the existing terms of the license and the price are acceptable to the library, the library may find it advantageous to purchase from the software publisher rather than some other distributor. Licenses will often sound much more restrictive than the publisher's intent. A library may choose to negotiate new terms with a publisher, and, in many cases, publishers are eager to comply. As such activity can be time-consuming, many libraries have adopted a policy, recommended by ALA counsel, whereby every purchase order carries some statement to the effect that the software would be lent in the manner of other library materials. This statement was considered to be binding if the publisher did not object. However, if the library purchases software from a jobber or discount house, such statements would be void since the publisher never had an opportunity to agree to them. If the library is required to sign a license agreement in order to ensure warranty rights and support, prior to signing, the librarian should confer with counsel to determine any municipal, university, corporate, or school district policies in this area.

The host organization often has its own policies concerning the purchase of software owing to the cost. The library may be asked to follow a procedure different than one it uses for purchasing other library materials when buying software. Whereas library materials
may not be subject to the scrutiny of purchasing departments, software purchases often are, especially if they are over a certain dollar amount. It behooves the library to try to integrate the acquisition process for software into the existing process for other materials in order to expedite purchase and have the freedom to purchase what it desires.

Another problem the library is likely to face is in terms of payment. Many software vendors are still unaware of the library as a potential market for their products, and they do not understand how library acquisitions function. Though they may have the means for dealing with institutional accounts, they are better equipped to deal with individual consumers with credit card in hand (Chiang & Curtis, 1987, p. 57). It is hoped that over time the situation will begin to change. But judging from the insignificant number of software vendors at library conferences, it is unlikely that vendors are actively courting this market and will be responsive to its needs.

**Discounts**

There are a number of ways to stretch the software dollar. For stand-alone software, most discounts are based on the number of copies purchased. Site licenses and multiple copy discounts for stand-alone software have evolved as a way to provide wider and more inexpensive access to software. True site licenses where one pays one price for the privilege of unlimited copying is rare, in part because vendors have little control over who makes the copies and whether they are used off site. Usually the vendor will offer big discounts for multiple copies. Sometimes in exchange for a substantial discount, the purchaser has the responsibility of copying disks and manuals. Sometimes there are discounts based on laboratory packages. These packages usually include one complete copy of software and documentation and some additional number of software programs.

Owing to the proliferation in local area networks, many vendors have developed network licensing terms. It will usually cost an institution more to make software available over a network. Network licenses can be based on the potential number of users (size of the population served), actual number of users (how many will actually use a particular numeric modeling package), or the number of ports or terminals with access to the software on the network.

Even when the library is purchasing single copies of software there are discount options available. The library should first investigate whether there are any institutional, regional, or consortia agreements with a particular vendor in which the library can participate. The library may choose to purchase demo copies or crippled copies of software that may be suitable for teaching but not for actual production. A program may be crippled by disallowing
certain functions such as the ability to save a program or print. The library can also opt to purchase through a software discount house. The computing magazines are filled with ads for discount houses like Mac Connection through which end-users can get substantial discounts on software.

Academic and school libraries can often benefit from educational discounts, though these are usually only available on noneducational products. These discounts can be substantial. Companies like Microsoft, Borland, or Claris separately package software for educational institutions and often offer a tiered structure of discounts based on the amount an institution may spend on their products in a given year.

Others may simply discount the product for any educational institution. In some of these cases the discounts are standard, but in other cases the library may have to negotiate with individual vendors. There are also software discount houses (brokers) who specialize in products for education. These organizations have already negotiated with vendors for discounts which may be based on quantity.

Evaluating the Collection

The software collection needs to be continually evaluated and assessed. Are there enough titles to satisfy demand? Enough copies? Are there gaps in the collection? Is there enough variety in the types of hardware supported? The level of expertise? What is the condition of the collection? Does it need bolstering or weeding? (Intner, 1988, p. 16). It seems strange to talk about weeding a collection of materials which are less than ten years old, but software quickly becomes obsolete. One question the library needs to ask is the extent to which the collection should be archival as well as current. If the library needs to maintain an archival collection, then it will probably need to maintain the hardware on which to run the software. This may become increasingly difficult if the hardware (e.g., the DEC Rainbow) is no longer manufactured and parts are difficult to find. At some point the library will probably want to let go of trailing edge technology and make a determination that it won't continue to collect for certain kinds of hardware.

It is equally important to assess how the scope of the collection is matching user needs. Both Intner (1988, p. 17) and Polly (1985, p. 158) stress the importance of ongoing consultation with end-users. Often users know more about what is the next bestseller in business or entertainment software before the librarian and they can help the librarian anticipate demand for certain software. As Intner says, the library cannot be faulted for not forecasting exactly what its users'
needs will be, but it can be faulted for not adjusting collection policy and practice to meet those needs (Intner, 1988, p. 17).

CONCLUSION

The selection and acquisition process for computer files remains a complex task a decade after these materials were first introduced into libraries, and selection is unlikely to become easier as more and more material becomes available in digital format. The library must seek out the most appropriate models for collection development to enable it to successfully implement a public access microcomputing service. Some of these models will be based on, and grow out of, existing library models, but many will be new. The greatest challenge awaits the selectors who must seek out, from among the world of published and unpublished files, those which anticipate and meet their patron needs and develop the expertise to enable them to make sound judgments about the value of each piece of software.
APPENDIX

Resources
These resources were either selected because they are comprehensive directories for a particular type of computer file or are good examples of some of the many types of resources available to help locate and evaluate software. Journals mentioned in that section are not included in this list.

Directories of Directories

SoftInfo Database. Available through the ISAAC (Information System for Advanced Academic Computing). ISAAC, m/s FC-06, University of Washington, Seattle, WA 98195, 206/543-5604, Bitnet: ISAAC@UWAEE.BITNET


Directories of Computer Programs—Comprehensive


Spring 1990 will be the last printed edition. Menu Publishing says that they will continue to update their database. For now, however, it is unlikely that they will continue developing the database in the long term future. Available on the DIALOG Information Retrieval Service, file 263 as The Software Database.


Directories of Computer Programs—For specific machines
Catalyst: A catalog of international third-party hardware and software for the education/research community. Mountain View, CA: Sun Microsystems, Inc.

Digital Equipment Corporation. Ultrix software sourcebook including both VAX and RISC based applications, 5th ed. Available from: Digital Equipment Corporation, Media Fulfillment, NR02-I/J5, 444 Whitney St., P.O. Box 5000, Northboro, MA 01532-9976.

Directories of Computer Programs—Specialized

COSMIC Software Catalog. Athens, GA: University of Georgia. Catalog to programs in COSMIC, the sole distributor of NASA developed computer software.

CALICO Database. CALICO, 3078 JKHB, Brigham Young University, Provo, UT 84602, 801/378-6533. A conclusive and complete reference service to information relating to any application of high technology to language. Database includes a software directory as well as a human resource directory and bibliographic database.

Directories of Data Files


Updated by the CD-ROM Librarian. A directory of 240 optical based products and their producers.


*Directory of online databases.* New York: Cuadra/Elsevier. 2 issues and 2 supplements/year. Contains information on over 4,600 bibliographic, numeric, full-text, referral, and software databases available through an online service, over networks, leased lines, or dial up to the public or to organizations.


*Guide to resources and services: Inter-university Consortium for Political and Social Research.* Ann Arbor, MI: ICPSR. Lists over 25,000 files in approximately 1,600 titles held by ICPSR.


Directories of Network Accessible Online Resources

*Internet resource guide.* (1989). Cambridge, MA: NSF Network Service Center. The resource guide has information on computational resources, library catalogs, software archives, white pages, networks, and network information centers. To obtain information about receiving the guide, contact the NSF Network Service Center at 617/873-5400 or send electronic mail to resource-guide@nsc.nsf.net

St. George, A., & Larsen, R. *Internet-accessible library catalogs and databases.* The directory contains a listing of over 100 resources including library catalogs and databases, dial-up libraries, campuswide online information systems, and bulletin board systems. Information on accessing the catalog may be obtained by sending electronic mail to stgeorge@unmb.bitnet or stgeorge@bootes.unm.edu

Sources of Public Domain Software Information

Glossbrenner, A. (1988). *Alfred Glossbrenner's master guide to free software for IBM's and compatible computers.* New York: St. Martin's Press. The book is in three sections: an introduction to software basics covering bulletin boards, shareware organizations, clubs and other outlets for software; descriptions of specific online systems, catalogs, and other sources; and recommendations for specific programs.

Although somewhat out of date, the basic information in this volume is still very valuable as an introduction to procedures for finding and acquiring public domain software.

**Evaluation Sources—General**

*Datapro reports on microcomputers.* Delran, NJ: Datapro Research, Inc.
Looseleaf service. Comparative reviews of business software with in-depth evaluations.

Monthly. Tests IBM PC software by focusing on one group of competing programs (word processing, spreadsheets, desktop publishing) at a time. Programs are tested for performance, error handling, versatility, ease of learning, and ease of use. Software digest now publishes a similar report for Macintosh software.

Monthly. Contains digests of reviews from a variety of journals for business, utility, educational, games, and personal software. Each issue contains fifty short reviews.

**Evaluation Sources—Educational**

Annual. Available through ERIC. Lists commercially available instructional programs for students in K-12, that have been favorably reviewed by members of the Educational Software Evaluation Consortium.

*EPIE micro-courseware PRO/FILES and evaluations.* Available from EPIE, P.O. Box 620, Stony Brook, NY 11790, 212/678-3340. Full product evaluations done by EPIE (Educational Products Information Exchange) Institute, the Consumers Union, Columbia's Microcomputer Resource Center, and six school districts.

*RICE: Resources in Computer Education.* Northwest Regional Educational Laboratory.
Available through BRS. The NWREL's comprehensive database of descriptive and evaluative information about microcomputer software for K-12 compiled through the MicroSIFT program. MicroSIFT ceased publishing individual evaluations in 1985 but continues to produce special reports on classes of software. These reports are indexed in RICE.

Annual guide lists over 200 programs chosen from 8,000 evaluations conducted by thirty-two evaluation services.

**Indexes/Abstracts to Evaluations Appearing in Journals**

Available through Dialog Information Retrieval Services, File 275, on CD-ROM or magnetic tape. Contains abstracts of articles appearing in over 500 journals, newsletters, tabloids, proceedings, and transactions covering computers, telecommunications, and electronics.

Quarterly provides subject access to practical and user-oriented computer literature appearing in eighty periodicals, books, and reports.

*Current index to journals in education.* CIJE. Phoenix, AZ: Oryx Press.
Available online and in CD-ROM, as part of the ERIC database. Probably the best single source for finding references to evaluations of educational software at any level.

*Microcomputer index.* (1980-). Mountain View, CA: Database Services, Inc.
Bi-monthly. Also available through Dialog Information Retrieval Services, File 233. The index is a subject and abstract guide to articles from fifty microcomputer journals. Publications indexed include *Byte, InfoWorld, Personal Computing,* and *MacWorld.*
REFERENCES


Intellectual Access to Patron-Use Software

SHEILA S. INTNER

ABSTRACT
SINCE 1960, LIBRARIES EXPANDED from nonexistent collections of computer-based materials for patron use to having rapidly proliferating software and/or data file collections. Development patterns of patron-use software collections and the kinds of materials they may contain are identified. Bibliographic control issues for patron-use computer-based materials are explored, including the level of control required or desired, and differing forms of access. Responses to these issues by the library community are described, including development of standard tools for descriptive cataloging, indexing, and classification, and the application of standard bibliographic systems to two varieties of collections—remote and local access materials. Trends indicating future issues are outlined, and the author suggests that the best strategies are those that address control and access problems for the long term, although they may be more costly and difficult to implement in the short term.

THE RISE OF COLLECTIONS OF PATRON-USE SOFTWARE
In the three decades between 1960 and 1990, libraries and librarians have gone from having no collections of computer-based materials for patron use and knowing very little about computers or the materials used with them to having rapidly proliferating software and/or data file collections, or, where they do not exist yet, facing growing demands to establish them. The types of computer-based materials now available vary enormously in purpose, function,
content, equipment required, and physical form. As a result, librarians must work hard just to keep abreast of a dynamic and increasingly complex marketplace of information products and services.

Library collections of computer-based materials have developed in different ways, depending on how and why they were initiated, which in turn was affected by the acquisition and use of computers elsewhere in the library's parent institution. Some of the earliest offerings at a few research libraries involved access to mainframe-based data files. These collections began to accumulate in sizable numbers early in the 1960s, and in 1974 the International Association for Social Science Information Services/Systems and Technology (IASSIST) was established by librarians handling them. Typically the data files in IASSIST libraries might have been generated locally within the institution or obtained from government or commercial sources, but they usually were not located within the library itself. Instead, the files were stored on the institution's mainframe computers, often located in a computer center physically and administratively separate from the library. To access the data on the mainframe, the library was given video display terminals without processing capabilities ("dumb" terminals) to use as input/output devices connected to the mainframe. For the users' convenience, the library retained any printed documentation that accompanied the data files, and it was the printed user guides, manuals, and other texts that comprised the library's part of the collection.

Beginning in the 1970s, libraries began to acquire access to mainframe-based bibliographic databases through membership in online bibliographic networks such as the Online Computer Library Center (OCLC) and the Research Libraries Information Network (RLIN), and by purchasing subscriptions to commercially distributed products purveyed both by nonprofit and profit-making organizations. Among the nonprofit, nonmembership bibliographic data systems to which libraries might subscribe were the National Library of Medicine's MEDLINE and the Library of Congress' MARC Distribution Service. Profit-making firms such as Lockheed and System Development Corporation (SDC) offered nonmembership bibliographic data systems that included large groups of individually produced online indexes and abstracting services previously available solely in printed book form—such as ERIC, AGRICOLA, and CHEM ABSTRACTS—which could be searched using one terminal and one set of commands. Databases such as OCLC, MEDLINE, and the DIALOG system were not considered library holdings, however, so librarians believed there was no need to exert bibliographic control over them, no reason to catalog and classify them, or to include bibliographic records for them in their catalogs.
At this time, libraries also began to purchase smaller computers—minicomputers—to perform library data processing such as inventory/circulation control and local catalog displays. Many of these minicomputers were part of a larger package of materials and services purchased from a vendor that included software as well as hardware, installation, training, ongoing maintenance and support, and research and development. Librarians did not consider the software they acquired in this way to be part of patron-use library holdings, either, and did not make any attempt to bring it under local bibliographic control.

Early in the 1980s, the development of microcomputers brought data processing into the realm of individual endeavor since, at least initially, microcomputers were intended as single-user machines. Unlike the larger minicomputers and mainframes designed to support group efforts with many disparate pieces of equipment—i.e., multiple inputs and/or outputs—microcomputers were self-contained units designed to process one task at a time for one input or output device (a typical library microcomputer station might have several input/output devices—e.g., keyboard, monitor, and printer—but the computer employs them one at a time). In addition to being smaller and single user oriented, microcomputers were inexpensive, hardy, relatively easy to learn machines that could be easily integrated into a library's existing environment. Microcomputers did not have to have specially controlled physical surroundings built for them, they could use ordinary electrical outlets, and their users communicated with them in English-language or quasi-English language style vocabularies. Librarians were quick to adopt microcomputing for administrative tasks such as word-processing, staff scheduling, personnel records, budget preparation, etc., and software began to be acquired to serve these purposes. As microcomputing became ubiquitous throughout society, in government, industry, and education, it is not surprising that libraries moved from staff-only software collections to patron-use collections as well.

The rapid spread of microcomputing elicited continuing research and development efforts to maximize the utility of the machines. Microcomputers continued to become smaller, faster, easier to use (termed friendlier), more powerful, and less costly. Most of all, methods of storing larger amounts of data—i.e., increasing the microcomputer’s memory—were sought. During the 1980s, new products emerged that enabled microcomputers to store as much data as the minicomputers and, some say, the mainframes of earlier days, and to provide links between microcomputers and larger “host” computers located elsewhere. New linking products, such as local area networks (LANs), faster and more powerful modems, and
communications software, were adopted by libraries, although many of these were used solely for internal library processes. Among the new data storage products, hard disks that extend random access memory and pre-recorded laser optical disks called CD-ROMs (Compact Disk-Read Only Memory) were immediate hits with librarians. A hard disk attached to a microcomputer enables it to increase the amount of its local data storage by a factor of ten, twenty, or more beyond what their flexible magnetic disks could hold. This has altered the way software and data are being administered in libraries and will be discussed elsewhere in this article. CD-ROMs are a different kind of storage disk in which data are scanned by a beam of light instead of being read by a magnetic head. Their advantage is that a much larger amount of data fits on an optical disk than on the same size magnetic disk.

Data files on CD-ROM are a byproduct of the mainframe-based databases originally built for shared cataloging, such as OCLC, or for the production of periodical indexes and abstracts, such as those marketed in the DIALOG system—AGRICOLA, ERIC, etc. All or part of the online databases are recorded on a CD-ROM disk and marketed to the library for use in their microcomputers on-site. (The vendor usually will supply the special CD-ROM disk drive that must be attached to the microcomputer if it is needed.) Although the CD-ROM version of the database is static and does not reflect updates made to the database after it is recorded, it allows access to a more recent version of the database than printed book versions, and it enables the library to avoid the additional telecommunications costs incurred by direct online access to the database in the host computer. Libraries are a willing market for CD-ROM databases, purchasing subscriptions almost as fast as they appear on the market, hoping to give up-to-date, high-tech service to users at much lower costs than online access. For some unfathomable reason, subscriptions to CD-ROM databases are being perceived differently than access to their online counterparts, and librarians are trying to control them as they have always done for the printed book versions.

In the balance of this article, bibliographic control issues for patron-use computer-based materials are identified, responses to them by the library community are described and explained, and trends to watch as indicators of future developments are outlined, together with this author’s opinions on where attention might be directed with positive results.

ISSUES IN PROVIDING INTELLECTUAL ACCESS TO PATRON-USE SOFTWARE

Establishing patron-use collections of any kind of material means
establishing some form of bibliographic control. Whenever a library wishes to control materials bibliographically, a host of familiar policy issues arise: What kind of control is required and desired—formal or informal? If a catalog of some sort is wanted, should full cataloging or brief listings be provided? What standards, if any, will be employed? How should the information be displayed for the library user? Who will provide it? These questions and others—such as how to process and under what conditions to store the materials, whether to allow open access to the shelves or other areas in which materials are kept, whether to classify the materials and how best to arrange them, etc.—have to be answered by librarians who decide to serve patrons with computer-based materials.

In the three decades between 1960 and 1990, two quite different types of patron-use collections of computer-based materials arose in libraries—mainframe-based data files and microcomputer-based software and data files. (Minicomputer-based software generally was used solely for the library's internal data processing and was rarely documented in the same manner as patron-use materials.) The mainframe-based data files, which began to be collected early in the period, were stored on computers located far from the point of use. The files were supplied to end-users in the library via terminals with textual documentation kept in the library. Thus, the "materials" themselves were invisible, both to the librarians and the users. In contrast, the microcomputer-based software and data files, which began to be collected in the last third of the period, usually were stored on site in the library. They received treatment similar to that of other nonbook materials such as sound and videorecordings, and might be used in the library itself with library-owned microcomputers, or, they could be borrowed in the same manner as books and other library materials and used elsewhere by the end-user. The two types of collections, which came to be called "remote" and "local" access materials, elicited different perceptions about how to treat them bibliographically, as described earlier.

In some libraries, microcomputer software and data file collections began as small numbers of titles intended for staff, but the size and staff-only focus changed quickly as the potential for patron service was recognized and addressed. When collections and user groups were both small, collection control could be informal, in the form of simple lists. The availability of thousands of titles within a short time after the introduction of microcomputing, however, and libraries' desire to acquire more and more titles plus their shift toward patron use of materials made it difficult for them to continue controlling rapidly growing collections so casually. In some places, centralized microcomputer laboratories were developed
for patron use where computer-based materials were stored and administered. Depending on the orientation of laboratory administrators and the expertise of their staff's, control might continue to be informal or locally-devised. (Reports from all types of libraries appearing in the literature attest to librarians' inventiveness in devising local treatments for computer-based materials [Baker, 1985; Dumlao & Cook, 1983; Mead-Donaldson, 1984].) Elsewhere, microcomputer hardware and software (including data files) were distributed throughout the institution. In either type of setting, however, the need for formal systematic controls arose in order to let users know what materials were available (i.e., to provide access) as well as to keep track of the holdings (i.e., to maintain bibliographic and inventory controls).

Ongoing rapid developments of hardware, software, and data file storage technologies make it difficult to identify short-term, simple, quick, and easy solutions to problems of access and control. The best strategies seem to be those that address access and control issues for the long term, and that acknowledge a need for flexibility and the development of staff with expert knowledge, even though such solutions tend to be more costly and difficult to implement in the short-term. In the next section, standard methods for bibliographic control and patron access are described.

Organizing Patron-Use Software: Rules and Tools

Organization of library materials rests on three components for which the library community has developed standards: description and access, indexing, and classification. Also, in view of the computerization of current library operations, the ability to transform bibliographical data into machine-readable form is assumed and standards for it should be added to those for the three components of bibliographic control and access. Standards accepted in the United States library community for these elements of organization are:

- the *Anglo-American Cataloguing Rules* (Gorman & Winkler, 1988; 1978) for description and access;
- *Library of Congress Subject Headings* (Library of Congress, 1990) for subject descriptors that comprise the indexing vocabulary;
- either the Dewey Decimal (Comaromi et al., 1989) or Library of Congress classifications (Library of Congress, 1917);
- and, the *MARC Format for Bibliographic Data, Computer Files* for machine-readable coding of data.

Each standard and its development are discussed later in greater detail, but it should be understood at the outset that there are no intrinsic obstacles to applying these standards to library software and data files. Furthermore, in this author's opinion, the advantages that obtain
from following uniform, standard, mainstream practices for books and other types of materials acquired for patron use apply equally to computer-based materials.

**CATALOGING OF COMPUTER-BASED MATERIALS USING AACR2R (THE 1988 REVISION TO AACR2)**

The first chapter of AACR2R, the standard code for describing materials and formulating headings based on descriptive elements, includes rules for all materials currently collected in libraries, including computer-based materials. AACR2R's rules are based on the international family of standards developed by the International Federation of Library Associations and Institutions (IFLA), known as International Standard Bibliographic Description (ISBD), which mandates the sources from which data should be taken, the elements to be included in the record, the order of elements, and the punctuation used to identify them. In addition to the first general chapter, AACR2R's chapter 9, titled "Computer Files," contains special rules that apply solely to computer-based materials, defined as "files that are encoded for manipulation by computer...data and programs...stored on, or contained in, carriers available for direct access or by remote access" (Gorman & Winkler, 1988, p. 221). The scope statement goes on to instruct catalogers to use chapter 10, "Three-dimensional Artefacts and Realia," for cataloging electronic devices such as calculators or software residing in a computer's permanent memory (i.e., ROM), which is considered part of the piece of equipment (Gorman & Winkler, 1988, p. 221).

Following this admonition, the rules themselves are quite similar to the rules for other types of materials found in other chapters, and only the unique features are addressed here, arranged by the element or area of description to which they relate (parenthetic numbers refer to related rules in AACR2R).

**Data Sources** (9.0): Data sources are adapted to the availability or lack of availability of computers to run the item being cataloged. Title screens are the preferred chief source of information, but, acknowledging that they are not a viable data source for catalogers without appropriate hardware, information from permanently affixed labels on carriers (i.e., disks, tapes, cartridges, or other storage media), accompanying documents, or containers (i.e., boxes or other disposable packaging) may be substituted in that order of preference. The source of the title must always be noted to aid the user of the catalog record in identifying items that may have different titles in the various locations.

**Title and Statement of Responsibility** (9.1): Catalogers are cautioned against using file names or data set names as titles, unless
they are the only names available. Another instruction directs that sponsors be listed in the notes rather than in the statements of responsibility.


*Material Specific Details* (9.3): Information about the character of the files is contained here, including whether they are data and/or programs, the number of individual files, and their length or composition. These data are particularly important to searchers trying to identify remotely accessed files.

*Publication, Distribution* (9.4): Computer file producers are equated with publishers.

*Physical Description* (9.5): Most of the special rules pertain to describing the physical composition of the item. Terms for carriers, attributes such as sound and color, and specific instructions about how to record dimensions for different types of carriers are related to various storage technologies.

*Series Statements* (9.6): No special rules appear for this area.

*Notes* (9.7): In addition to the special note for the data source used for the title, unique notes include "system requirements" (describing the hardware and other requirements for using the item), "file characteristics" (adding information not contained earlier in the record), and "other formats" (in which the issue of the same file for use with another type of computer may be noted). Also, under the instructions and examples for data pertaining solely to the copy of the item being cataloged is the direction to record a data set name (and presumably, although it is not specifically stated, a file name), if desired.

*Standard Number and Terms of Availability* (9.8): No special rules appear for this area.

These rules, which seem to work well when the catalogers applying them have sufficient familiarity with computers and computer-based materials to understand them, evolved from an earlier version of chapter 9 published in the original AACR2 in 1978. The rules in the earlier chapter were based on an assumption that no physical item in hand was possible since the materials—data files—would actually reside on a mainframe at some distance from the point of use (or the point of cataloging). They had no provision for physical description, and the number, size, and other characteristics of the invisible files were substituted for a description of physical objects. Information was expected to be taken from documentation rather than from the files themselves. The materials were called "machine-readable data files," failing to acknowledge that libraries might collect
programs, program packages, or the other items more generally termed software.

"Machine-readable data files (MRDF)," the official designation for these kinds of materials, was challenged on four counts: (1) for being too lengthy, particularly since cards still were the dominant catalog display medium; (2) for being too narrow in scope, since it did not appear to include software; (3) for being slightly inaccurate, since microforms, motion pictures, videorecordings, etc., all could be deemed "machine-readable" as well as computer files; and (4) for failing to include "computer" as one of the words in the phrase, which caused confusion for persons unfamiliar with the medium.

Lobbying efforts to change the name and the focus of the 1978 chapter from remotely stored mainframe files to locally available microcomputer materials began with the advent of microcomputers in libraries along with collections of microcomputer software. Although data file librarians protested that "data file" could be construed to include software, and that files were files whether they were stored on a mainframe or on a disk that one put into a microcomputer, it became clear as time passed that a groundswell of dissatisfaction with the then-current rules was gaining momentum, and that it could not be ignored.

National level groups in each of the countries responsible for AACR2 began working on alternative rules. In 1984, after eighteen months of work on the part of a dedicated task force co-chaired by Arnold Wajenberg of the University of Illinois and Ben Tucker of the Library of Congress, the American Library Association's Committee on Cataloging: Description and Access (CC:DA) approved and published an interim interpretation of chapter 9 titled Guidelines for Using AACR 2 Chapter 9 for Cataloging Microcomputer Software (ALA, 1984). This brief document, which had authority solely within the U.S. library community, explained such arcane exercises as how to count the files in a program package contained on a 5.25 inch floppy diskette and what to do if the number could not be determined, added a means of identifying the number and type of disks or other physical objects deemed "carriers" of the computer files being cataloged, and created a "systems requirement" note to describe the hardware needed to use the item. The guidelines did not alter the general material designation or define the material specific details area. It included a relatively large glossary of computer terms that library catalogers found very helpful, since many of them were not conversant with the jargon.

Similar efforts abroad resulted in reports from interested groups in Great Britain, Canada, and Australia, and, eventually, an official proposal from the British to the Joint Steering Committee for
Revision of AACR (the international body with sole authority to make rule revisions to AACR) for changes to chapter 9. The British proposal stimulated CC:DA to appoint a new task force to consider methodology for reviewing the chapter preliminary to formulating a U.S. proposal or responding otherwise to the need for revised rules. During the same period, IFLA had appointed a working group charged with creating an ISBD for computer files which would be completed and published in 1989, a year after the AACR2 revision (ISBD [CF], 1989). As these various groups worked on reports and proposals, gathering information, sifting it, and weighing alternatives, AACR2 editor Michael Gorman drafted a new chapter 9 and worked feverishly with members of the Joint Steering Committee to obtain unanimous approval for it before the publisher's deadline of December 1986. At that time, the publishers were going to press with a revised edition of AACR2 that would incorporate the many large and small changes to all parts of the text authorized since 1978.

Final approval of a new text of chapter 9 was obtained from the Joint Steering Committee in late 1986, and, acknowledging the need, it was published separately (Gorman, 1987). The text appeared, with minor amendments, in 1988 in the new issue of AACR2 and was accepted as the current standard at this writing. The most dramatic changes were the following:

- the chapter name and general material designation was changed from "machine-readable data file" to "computer file"—a compromise;
- data sources were made consistent with other chapters and with the principles of preferring sources closest to the item itself;
- information about file characteristics were removed from physical description and relocated to the area for material specific details, newly defined for computer files;
- physical objects in hand—i.e., the disks, cartridges, etc.—called "carriers" were described in the physical description area in the same manner as for all other types of material; and
- notes, such as systems requirements, file characteristics, etc., were augmented and interpreted appropriately for computer-based materials.

One might believe that nine or ten years is a long time to accomplish the rule changes in AACR2 that catalogers needed to describe microcomputer software easily and adequately according to an authoritative standard, but for any endeavor involving several countries and diverse constituencies, the time frame probably is not unusual. The 1988 standard code—i.e., AACR2R—makes description and descriptive access for computer-based materials consistent with
all of the other types of materials covered by the rules, and affords librarians the valuable opportunity of integrating these records with records for books, maps, sound recordings, films, videos, and everything else cataloged in the operational mainstream.

Indexing Computer-Based Materials

To follow the standard procedures for indexing (called "subject cataloging" by library catalogers), terms used as subject descriptors for computer-based materials must come from whatever authorized list of terms is used for other materials, namely Library of Congress Subject Headings (LCSH), Sears List of Subject Headings (Sears), Medical Subject Headings (MeSH), or another published standard indexing vocabulary used by individual libraries. There is greater tolerance for variation among libraries in adopting a standard for indexing than is acceptable for descriptive cataloging, because, ideally, the vocabulary chosen should match users' capabilities—i.e., the knowledge levels and subject expertise of individuals using the catalog—as well as accommodating variables of collection size and degree of subject specificity. Since collection size, scope, depth, and user profiles vary from library to library, one standard vocabulary is unlikely to satisfy them all equally well.

The most widely used of the three lists mentioned earlier, at least within the United States and Canada, is the Library of Congress Subject Headings (LCSH). A majority of academic and public libraries use LCSH, as do large numbers of school and special libraries. LCSH's current popularity may well be attributable to its use on printed catalog cards distributed by the Library of Congress since the early 1900s and the availability of the published list dating back to 1909. Even if they were not perfectly matched to a library's needs, LCSH descriptors were there for the taking, saving individual libraries the time, effort, and cost of purchasing and using another tool solely for subject descriptors or devising and documenting descriptors of their own. In view of its wide use among the several sectors of the library community, only LCSH will be described here. Much of the discussion is applicable also to Sears (published by the H. W. Wilson Co.) and MeSH (published by the National Library of Medicine).

Nine complete editions of LCSH appeared by 1980. In the decade from 1980 to 1990, however, this standard tool containing more than a quarter of a million descriptors was transformed from irregularly issued editions of printed books—the familiar large red volumes—or more frequently issued microform versions, to a fully computerized online file available in any of several computer-based media including magnetic tape, CD-ROM disks, and direct online service for any library linked to the Library of Congress as well as in microforms
or printed books, now issued annually. The task of digitizing the list was a formidable effort, requiring first the development of a MARC format for subject authorities, a template that could accommodate authorized heading forms, unused forms, several kinds of references, and documentation of sources, and subsequently a massive project inputting the records for each of the hundreds of thousands of existing descriptors. Once completed in 1989, however, the online file (called LCSH-mr for “machine-readable”) became simple to change in order to add, delete, or alter descriptors.

Since the early 1980s, totally new descriptors for books about computers and all the sub-topics in computing have been established in large numbers that show no sign of diminishing. If anything, problems might occur now because too many potentially overlapping terms are authorized in LCSH—e.g., “Computers,” “Electronic digital computers,” “Minicomputers,” and “Microcomputers.” At one time, Library of Congress subject catalogers resisted accepting new terminology rapidly or changing established terms to update terminology—e.g., “Electronic data processors” to “Computers”—because of the cost and staff time required to alter existing records, but with the additional flexibility afforded by the online status of both bibliographic and subject authority files this barrier is rapidly disappearing.

The pilot project for the Machine-Readable Collections Reading Room (MRCRR) at the Library of Congress has been made permanent. Since the autumn of 1989, all software producers are required to deposit a copy of their items with the Library of Congress; LC is no longer willing to catalog from the documentation alone. The free floating subdivisions of “Software” and “Juvenile software” are now being used for all packages cataloged by LC, and 10-15 headings for the software itself are now being reviewed (D. Beaubien to Ann Fox, cataloger, Special Materials Cataloging Division of the Library of Congress, personal communication, January 23, 1991).

Using a list of descriptors that contains relevant terms is the first and most important concern, but it is not the sole concern for librarians who wish to provide effective subject access. The second concern is the way the descriptors are applied—i.e., the policies governing their use. The Library of Congress’ Subject Cataloging Division makes such policies for its own operations, and, at catalogers’ requests, began publishing these policies for general use in other libraries (Library of Congress, 1990). Unfortunately, computer files were not routinely collected and cataloged at the Library of Congress until the summer of 1988, so few policies for their subject access had been established before that date. The library approved a pilot project to provide Cataloging-In-Publication for 1,000 computer files
early in 1987, but implementation was delayed because completion of higher priority projects has taken longer than anticipated. Thus, in considering LCSH descriptors for use with computer files, one must understand that little help is forthcoming from the usual sources. Also, LCSH descriptors were devised solely with books in mind. While many descriptors are valid for topical information in any physical format, all of them are not equally appropriate for books about computer software and the software itself, which are two quite different things.

Policies for effective access to nonbook materials have long been a concern of librarians in the field, and two committees of the American Library Association’s Association for Library Collections and Technical Services have addressed them—the division’s Audiovisual Committee and the Subject Analysis Committee of its Cataloging and Classification Section. Joining forces to help the Library of Congress develop plans for its microcomputer Cataloging-In-Publication project, the two committees have worked both cooperatively and separately on assisting librarians with problems of subject access. As early as 1984, the Subject Analysis Committee appointed an ad hoc subcommittee to propose guidelines for subject access for microcomputer software and held hearings to solicit ideas, opinions, and responses from librarians. In 1986, the recommendations of the subcommittee were published, furnishing four fundamental principles and one caveat to be followed in making local policy decisions for the subject cataloging of software (Guidelines on Subject Access..., 1986).

- treat microcomputer software in the same manner as all other materials;
- assign subject descriptors and classification numbers using the same standard tools as for other materials;
- use the same criteria to determine subject content and represent it in descriptors and classifications, generally classing first by topic, then by form;
- if a form subdivision is desired, the term software is suggested;
- do not make main headings for the form of the software or for the make/models of the hardware, operating systems, etc., although they could be subdivisions (pp. 5-6).

For the most part, these principles are based on common sense and the desire to use descriptors to reveal the subject content of materials. One can visualize easily how useless the suggested subdivision "software" or any other form heading would be to searchers if it was the primary descriptor for numerous items covering topics from arithmetic to zoology. Following the principles is not difficult if catalogers can determine the subject content of the materials
they are indexing. The lack of requisite hardware to sample the contents of a piece of software or the failure to understand descriptions of its contents and intended uses because of unfamiliarity with the terminology both may confound effective indexing every bit as much as the failure of LCSH to contain a desired descriptor.

Classifying Computer-Based Materials Using Dewey and LC

Issues discussed in connection with LCSH apply also to the use of standard classifications such as the Dewey Decimal Classification (DDC) and Library of Congress Classification (LCC) for computer-based materials. Both classifications were devised with books in mind, and their categories and terminology are not always appropriate for nonbook materials. Often, desired categories are missing because particular topics appear in computer-based manifestations before they surface in books, and, without a basis in printed books (i.e., "literary warrant"), the topics will not be established by the classification. The Library of Congress, which assigns "official" DDC and LCC numbers to books, does not classify computer-based titles and thus does not supply even a nucleus of examples for other catalogers to emulate, nor does it establish policies for their classification (in OCLC, approximately 32,000 records for computer files have been entered into the Online Union Catalog, only four of which are attributable to the Library of Congress). Nevertheless, it is incumbent upon catalogers to arrange computer files in some meaningful order, especially if local policies mandate open stack patron-use collections that lend themselves to being browsed.

Both DDC and LCC are enumerative classifications and are based on the principle of classification by discipline. The enumerative character of the classifications means that, to be assigned, classes must be available in their schedules. Missing classes cannot be constructed by the classifier when they are needed. The disciplinary based character of the classifications means that, in both schemes, materials about different aspects of computing will be classed far from one another rather than being collocated in one place on the shelves. In DDC's 20th edition (1989), most computer-related topics occur at 004-006, but research and information systems are at 621+ with electronic engineering, and 519+ with mathematical probability theory. The 004-006 schedule is a complete and greatly expanded revision of numbers at 001.64+ in the previous edition, which were filled to overflowing with the outpouring of computer-related publications of recent years. The few classes available in the 19th edition could not organize and arrange the rapidly developing subject area. Listings in the Relative Index for terms beginning with the
word "computer" also include numbers in the Social Sciences (3xx), Business (65x), Printing (68x), Art (700), Games (79x), and Library Science (025+) as well as numbers in the auxiliary tables in which some aspect of computing is to be added to class numbers from the schedules.

LCC also separates materials about computers by disciplinary focus, placing most topics at QA76+ as a subset of mathematics and at TK (electronic engineering), although other topics may be found elsewhere, too, depending on the aspect of computing being represented. Unlike DDC, LCC does not have a combined index to which one can turn for a collocation of terms beginning with the word "computer." It is more difficult to see an array of classes for computer-related topics in one place. But LCC's much greater specificity, reflected in a much larger number of classes, accommodates close classification more easily than DDC. LCC also expanded its principal computer-related sections in QA and TK considerably to accommodate new topics and topics requiring additional subdivision.

A major difference between DDC and LCC is the way they subarrange materials within a more general class. DDC is hierarchical and tries to place topics in meaningful relationships to one another. LCC is not hierarchical and usually leans toward alphabetic or geographic subarrangements (and, sometimes, both together). While LCC's arrangements are systematic and organize large collections with relative ease, they are not satisfying to browse, since materials are interfiled without regard to their subject relationships.

An important adjunct to classification numbers in completing a shelf address for each item in the patron-use computer-file collection is the assignment of book or shelf marks. Shelf marks (it seems counterproductive to call them "book" marks when the focus of the discussion is not books) may include Cutter numbers; dates; collection marks such as "Reference," "Branch," or "Juvenile"; and volume numbers and/or copy numbers, depending on local library policies. Dates, collection marks, volume, and copy numbers are as easy to assign appropriately to computer files as to any other type of material. But Cutter numbers are another thing, and greatly expanded lists of Cutter numbers have been devised and published that offer valuable assistance to catalogers dealing with large computer file collections (Leysen, 1986a, 1986b).

There are compelling reasons to utilize the same classification and shelving systems for patron-use computer materials as are used for other patron-use materials. Adoption of the same classification for all library materials regardless of their physical form enables both patrons and staff to transfer what they know about the subject classification and arrangement of one type of material to all other
types. This makes computer-based titles easier to classify for members of the cataloging department staff, easier to shelve for members of the collection maintenance staff, easier to retrieve for members of the reference staff, and easier to browse for members of the public. There do not seem to be any compelling reasons to do otherwise, for even if the collection is completely closed, the classified arrangement can be made available to searchers through an index or shelflist. In the event the collection is closed to patron browsing, assistance in selecting an item rests entirely on the catalog record, including the subject descriptors and classification that might appear there. Given the useful nature of classification for browsing and serendipitous discovery, it would seem a shame to eliminate these potentials for service.

Coding and Tagging According to the MARC Format for Computer Files

The final element in standard bibliographic access and control is inclusion of the bibliographic records in a computerized database of bibliographic information in a standard format. Lack of entry into such a database means exclusion from the mainstream of library materials and services since computerized bibliographic networks have become the most important sources of information for collection development, cataloging, and use, and local library systems usually depend on the availability of data in this form. The MARC (MACHINE-Readable Cataloging—i.e., USMARC) format developed by the Library of Congress has become the U.S. national standard communications format for computer-based bibliographic data, not only by default, since no other standard has been developed, but also by virtue of its publication as a standard of the American National Standards Institute (American National Standards Institute, 1977; Library of Congress, 1980).

Separate formats have developed over the years for monographic books, serials, films and videos, musical scores, sound recordings, maps, and other types of materials. A MARC format for computer files (and its predecessor, machine-readable data files) was, indeed, developed by the groups responsible for the standard—i.e., the Library of Congress' MARC Development Office and the American Library Association's interdivisional Committee on Representation in Machine-Readable Form of Bibliographic Information (MARBI). As mentioned earlier, the format has not yet been made available for use by catalogers at the Library of Congress at this writing, but it has been adopted and implemented by the major bibliographic networks and is being used by the thousands of libraries cataloging in those systems.

Details of the computer files format are similar to those of other
formats with some exceptions. The coded description of the item being cataloged, known as the "fixed fields" in OCLC and RLIN and the 008 field in USMARC, has special fields to represent the type of files being cataloged and the type of machine they require (i.e., a computer or "other" type of machine), features unique to computer files. Two special variable fields, 538 and 753, accommodate the systems requirement note and an added entry for the make and model of the computer, respectively. Fields for title variants accommodate computer files' penchant for having acronymic "official" titles that are spelled out subsequently or spelled out "official" titles that are acronymized elsewhere on the items. Fields for some of the information associated with serial publications are defined in the computer files format so that serially published files can be represented without having to substitute use of the serials format, which in turn would not be able to accommodate some of the data unique to computer files.

In recent years, dissatisfaction with the proliferation of separate formats having differing field definitions and the ensuing inconsistencies among formats resulted in calls for integration of the formats into one consistent structure (Attig, 1983; 1989). In 1987, a format integration proposal was put before MARBI and agreement on various issues resolved in the years that followed. Knowledgeable experts suggest that implementation of the final format integration proposal will begin in the field before 1995. Format integration may have fewer impacts on the computer files format than, for example, on the audiovisual/visual materials format used for films, videos, etc., because fields for representing certain types of data such as multiple name versions, seriality, etc., have already been defined in the existing computer files format. Since the computer files format was a recent addition to the family of MARC formats, developers were conscious of the problems created by failure to include these fields in the formats for other types of media.

**CURRENT STATUS**

To sum up, standard tools supporting standard policies and practices for cataloging, indexing, classifying, and computer coding information for access to and control of computer files are firmly in place and as fully developed as they have ever been for any nonbook media materials. That they should be employed in place of nonstandard alternatives for providing access to patron use data file and software collections is highly recommended without reservation by this author. Nonstandard alternatives, no matter how attractive they may appear to be, are not part of the mainstream of library systems and services and stand to fail to remain adequate over the long term for two reasons:
1. nonstandard alternatives eventually add more work to information storage and retrieval processes than standard treatments by requiring special tools, training, and systems; and
2. nonstandard alternatives eliminate the potential for economy, effectiveness, and efficiency by being incompatible with mainstream systems and services.

FOR THE FUTURE

Two factors indicate that the delicate equilibrium suggested by the foregoing conclusion is unlikely to persist for very long. The first and perhaps the most important factor is that technological developments in computing are being pursued vigorously and are intensely competitive, resulting in a field that is not just dynamic but highly volatile. Also, it is a field over which librarians exert very little, if any, influence. The second factor is that library responses to progress in the field have, to date, tended to be extremely slow, cautious, and limited, focusing on making as few changes as possible. This kind of scenario tends to lurch from crisis to crisis without much hope for developing a flexible, responsive, knowledgeable, and reliable problem-solving structure. Some of the potential crises that loom ahead include the following:

- the use of microcomputers with hard disks means librarians can load microcomputer software onto hard disks and distribute them via local or wider area networks, and implications for bibliographic access appear to be very similar to the original mainframe-based data files in which no item in hand was available for cataloging, indexing, and classification;
- interactive multimedia technologies employ computer software, video, sound, and textual images with user responses in new combinations that have not yet been addressed by access tools;
- new emphases on resource-sharing and cooperative collection development projects would indicate the greater importance of access to materials held outside the home library, but shared by it; and finally
- new products and services are tilting heavily in favor of full-text, cataloged, and indexed collections of titles in online or CD-ROM databases as opposed to individual items marketed separately and will require entirely new kinds of policies and treatments.

Clearly, librarians need to undertake a thorough exploration of options available for expanding access to local materials as well as for establishing links with collections outside the library and the parent institution, and they need to do so quickly. Simpler mechanisms for altering cataloging rules, lists of subject descriptors, and classification schedules must be sought to help librarians meet
the demands of a rapidly evolving field. Methods of incorporating user knowledge into the process, suggested by Bates (1989) and others need to be considered and addressed (Koenig, 1990). Strategies for utilizing the cataloging that might accompany purchased products and integrating it with other library cataloging need to be anticipated. At the same time, librarians must prepare themselves with more knowledge, better training, and more flexible managerial skills, including critical evaluation, decision-making, risk-taking, problem-solving, and creative thinking, and build staffs with more knowledge, better training, and a desire to contribute to patron service in order to meet the tests that lie ahead.

ENDNOTES

1 For the purposes of this paper, the term computer-based material includes all informational materials requiring a computer to use, read, view, or hear.

2 For the purposes of this paper, the term software will include individual programs and groups of programs known as program packages that enable people to use computers to perform various processing manipulations. The term data file will include any type of textual or numeric data (with the exception of programs or groups of programs) requiring the use of a computer to read, view, or hear—e.g., the word-processing package. Microsoft Word used to write this article is a software item, but the actual text is stored separately on a computer disk and is considered a data file.

3 The ISBD structure calls for the following elements in this order: Title and statement of responsibility; edition; material-specific details; publication, distribution information; physical description; series statement; notes; and standard numbers and terms of availability. The newest of the ISBDs, developed originally for monographic books (ISBD[M]) and subsequently for serials (ISBD[S]), printed music (ISBD[PM]), and other material forms is (ISBD[CF]) (for computer files).

4 The position of the Committee on Cataloging: Description and Access in the organizational hierarchy of the American Library Association is not as simple as it would appear from this statement. In the early 1980s the committee (abbreviated CC:DA) was part of the Cataloging and Classification Section of the Resources and Technical Services Division of the American Library Association (i.e., CC:DA/CCS/RTSD/ALA). In 1990, the division changed its name to the Association for Library Collections and Technical Services (ALCTS). Thus the committee, which remains at the fourth level of hierarchy, could now be fully abbreviated CC:DA/CCS/ALCTS/ALA.

5 MARBI consists of three representatives each from the Association for Library Collections and Technical Services, Library and Information Technology Association, and References and Adult Services Division. In addition the committee has ex officio representatives from the Library of Congress and the National Library of Canada as well as receiving liaison representatives from OCLC, the Research Libraries Group (RLIN), Utlas International, the Western Library Network, CLASS, NOTIS, UCLA (Orion), the U.S. Government Printing Office, the National Agricultural Library, the National Library of Medicine, and other interested groups.

6 This statement is based on reports of OCLC's Glenn Patton and RLIN's Ed Glazier to the membership of OnLine Audiovisual Catalogers given at their business meeting on 18 October 1990 in Rochester, New York.

REFERENCES


American Library Association. Committee on Cataloging, Description and Access.


ADDITIONAL REFERENCES


OCLC Micro. (1985- ). Dublin, OH (bimonthly. Some issues are accompanied by disks containing utility programs).
Software for Patron Use in Libraries: 
Physical Access

MARY LOUISE BRADY, ILENE F. ROCKMAN & DAVID B. WALCH

ABSTRACT

Physical access issues in providing patron-use software are not limited to circulation. Providing hardware in the library rather than simply circulating these items creates a number of other issues to consider. The working relationships between libraries and computing centers must be addressed as circulation policies and procedures are developed. Alternatives to circulating floppies include the use of hard disk technologies and local area networks (LANs). Freeware, shareware, and site licenses are cost-effective ways of making certain types of software available. Security issues include the danger of viruses and other potential disasters. Examples from academic, public, and school libraries reflect different approaches for providing physical access to software.

INTRODUCTION

The overwhelming impact brought about by emerging microcomputer technology in the early 1980s was felt by nearly every facet of society, including libraries. Several libraries forged ahead in making this new technology available to their users, and in doing so, encountered new problems, unique challenges, and a different jargon that would cause them to carefully review and rethink how they would accommodate their users’ desire to access both microcomputer software and hardware. This article focuses on physical access and
reviews many of the issues encountered in making this relatively new type of material available to the library user. Fundamental issues related to the circulation of “floppies” are reviewed. Hard disk and LAN options to these traditional circulation procedures are considered. While libraries have long fought the battle of book damage and torn-out pages, the advent of software has brought new concerns such as viruses and expanded requirements for coping with disasters and preservation. These concerns are explored in some depth. Microcomputer technology has also placed new demands and requirements on the library building as well as the budget. For academic libraries there has been a rethinking regarding their relationship with campus computing organizations in making both microcomputer hardware and software available. These issues are addressed. The article concludes with case studies that briefly describe how academic, public, and school libraries have successfully coped in providing physical access to microcomputer software and hardware.

Circulation Issues

During the early 1980s, as the popularity of microcomputers grew, and their prominence in the work, school, and home environments increased, libraries were faced with the challenge of adding these new materials to their collections. Without question, meeting this challenge required creative approaches and sound decisions for handling the circulation and storage of these new materials (Rockman & Kemp, 1986; Strauss, 1986). Although much has been learned over time and with experience about the treatment and lending of public access software, salient questions still remain:

1. What is an acceptable loan period?
2. Should some disks circulate individually for short term (in the library) and long term (outside the library) while others circulate only internally through a file server or local network arrangement?
3. Should all producers’ software (e.g., commercial, shareware, public domain) have equal loan periods?
4. Should all functional types of software (e.g., utility, recreational, educational) have equal loan periods?
5. Should users be required to sign proficiency and copyright compliance statements before software is loaned?
6. Will returned software be checked for damage (rebooted) and completeness (disk and documentation)?
7. Will fines be levied for lost or damaged material?
8. Will limits be placed on the number of disks which can be loaned at any one time?
9. Will software conform to the same interlibrary loan and reserve
(hold) policies as other library materials?
10. Will original or back-up copies of the disk circulate?
11. How will disks be protected from viruses?
12. How will the purchase of site licenses affect the circulation of individual disks?
13. How should disks which accompany material as supplements (pocket parts) circulate—i.e., with the material or separately?
14. How will electronic security and theft detection systems affect the circulation of disks?
15. How should materials be processed (e.g., ownership stamps, labels, date due slips, etc.) for circulation?
16. Should disks be repackaged, protected, or cushioned against harm before circulating?

Often, the type of library, user clientele, size of collection, staffing patterns, budget, and local service policies will dictate answers to these questions. Once decisions are made, written policies to guide daily operations need to be established. In formulating policies and procedures for loaning software, it is important "to strike a balance between providing effective access for users and reasonable protection" for libraries (Demas, 1985, p. 20). Also useful to consider before beginning to circulate software is how a library will deal with issues of "potential damage to the software and copyright violations" (Paskoff, 1989, p. 309), if "libraries should consider circulating software, even when they don't have computers" (Polly, 1986a, p. 22), and how back-up copies will be treated (Talab, 1987, p. 37).

In examining issues related to the circulation of software, Intner (1988) observes that one decision will often affect another:

Designating software collections as noncirculating avoids some tricky problems, particularly those involved in the logistics of circulation and concerns about compliance with copyright limitations (although clever patrons can contravene them right under your nose). Limiting the use of software to the library building, however, automatically requires that the library provide computers for public use. No matter how many computers you have, there are never enough....You will (also) have to purchase and maintain printers and other peripherals....It is a costly business. (pp. 7-8)

Libraries also need to be sensitive to external factors, such as proposed legislation, which can influence and potentially alter their local decisions. The Computer Software Rental Amendment Act of 1989, also known as Senate Bill 198, is a case in point. Although not targeted specifically to libraries, the original language of the bill threatened the ability of all types of libraries to freely circulate software. Because of library concerns, representatives from the American Library Association testified before the Senate Subcommittee on Patents, Copyrights, and Trademarks in April 1989 to
convince lawmakers to exempt libraries from this bill which would amend the United States Copyright Act to prohibit the rental, leasing, or lending of computer programs (Flagg, 1989, p. 482). Due to the active mobilization of the library community, the language of the bill was subsequently modified to grant an exemption to nonprofit libraries, with the proviso that each copy of a computer program lent by a library contain a warning label affixed to the package alerting users that the program is protected under the copyright law ("Computer...," 1990, pp. 7-8).

**HARD DISK TECHNOLOGY**

As noted, there are a number of questions and issues related to circulating software. One alternative is the use of hard disk technology, which is rapidly becoming more and more popular in libraries. Hard disk technology allows the librarian to place application software packages, such as word processors, spreadsheets, and database programs that require more disk space on a hard disk. Hard disks help to prevent damage to floppy disks by eliminating excess handling of disks by numerous users, many of them novices.

Another advantage of hard disk technology is that it is less complicated for the beginning computer users since they have access to a menu which will allow them to enter a given program easily, or move from one application to another with ease. The user does not need to worry about system disks or booting a program from a floppy disk. The computer can also be equipped, not only with a hard disk, but with a 5 1/4" or 3 1/2" floppy disk drive that will allow the user to save files to personal disks rather than to the library's hard drive.

Disadvantages of hard disks include: users manipulating files thereby causing system malfunctions; the time required to purge obsolete files or files that patrons have knowingly or unknowingly saved to the hard drive; having to provide security not only for the equipment, but also for the programs that are on the hard drive; maintenance; costly repairs; lost data; and time needed to teach novice users how to access software.

Nelson (1989) sums up the advantages of hard disk technology when she states in her definitive work:

> advantages to the use of hard disk systems greatly outweigh their inherent disadvantages. Hard disks are so superior to floppy disks in terms of manageability, data storage capacity, and speed and power of data manipulation that every microcomputer user must at some point consider adding these units to older hardware models. (p. 117)

Maintaining the hard drive for the novice manager can be simpler with the aid of a good diagnostic program such as *SpinRite* or *Disc Technician*. These software programs can detect and rectify many
drive problems, thereby prolonging the life of the hard disk.

**The Local Area Network Option**

Another option to circulating floppies and a way to capitalize on the use of software is the use of a local area network. A great deal has been written on LANs, and definitions range from the complex to the simple. Hensinger (1990) defines a LAN as "an integration of hardware, cabling, operating systems, and LAN software" (p. 27). Walton's (1990) definition states: "A LAN (local area network) is essentially a communications system for microcomputers. It allows all sizes of libraries to increase the usefulness of micros by sharing hard disks and printers and coordinating access to expensive software programs" (p. 54).

Breeding (1990) provides a clear definition of LANs as follows:

Local Area Networks (LANs) allow groups of microcomputers to share resources. With a LAN, individual microcomputers have access to more resources than would be available if they did not participate in the network. LANs allow users of the network to share common databases, spreadsheets, and documents as well as communicate throughout the network with electronic mail. In many cases it is more economical to concentrate resources on a LAN server rather than purchase hard disks and printers for each microcomputer in an organization. (p. 16)

Advantages of a LAN are similar to that of a hard disk but more extensive. By providing online software, the network removes the need for physically circulating and handling floppy disks, it allows several patrons to use the same program simultaneously, and it eliminates the need to buy several copies of a program thus reducing costs. Librarians need to be aware that most software companies provide substantial discounts for network versions of computer programs over the cost of purchasing several single use copies. The use of a program on a LAN that is meant for single computer use is not only illegal, but could cause a patron to lose data since the non-networked software is not configured for network use.

For the librarian seeking a thorough analysis of LAN use, William Saffady (1990) provides an excellent explanation of local area networks as well as a tutorial survey of LAN concepts and technology, emphasizing information that the librarian responsible for the LAN will need in order to wisely plan and implement such a network. Part three of his article describes and discusses the characteristics of the most important types of local area networks. The report ends with a select list of resources for further study.

If Saffady's article seems a bit heavy to begin the study of LANs, Jackie Fox (1990) does a good job in introducing the neophyte librarian to local area networks in her "Introduction to Local-Area Networks." In addition to a very down-to-earth description of what
composes the LAN, such as the network's operating system, the cables, the network's interface card, the protocols, and topologies, Fox also gives a simplified version of just what takes place when a patron requests a file on the network (p. 20). For those who want to ease into LANs, Watson (1990) presents an overview of the LANtastic LAN from Artisoft, Inc. (p. 15).

The attributes of an ideal network have been outlined by Weidlein and Cross (1986) as follows:

1. *Simplicity.* The network should be simple to configure, connect and use. It should be reliable and secure. A minimal amount of technical expertise should be enough for a user to take advantage of the PC network's full range of capabilities.
2. *Flexibility.* Adding new devices, moving, and rearranging the network should cause minimal disruption...
3. *Compatibility.* Different equipment should be able to communicate and interact through the network.
4. *Optimum speed and bandwidth.*...
5. *Security.* A network must provide an easy means of protecting existing information storage with backup and copy routines.
6. *Low cost per connection and maintenance.*
7. *Reliable and archival storage.*
8. *Interface support.* The network should support a method by which dissimilar networks can be interconnected.
9. *Broad range of applications.* (p. 68).

**Network Management**

No matter how willing a staff is to take on a computer network, there should be at least one person capable of managing the system. That person needs to be knowledgeable about troubleshooting the system, especially when a patron finds that they are unable to access the program they want, or someone has erased the "autoexec" file, or a cable has come loose, or when a myriad of other problems appear just when patrons seem to need the network most.

The same person responsible for keeping the network operational must also know how to install software upgrades of all types, and have the ability to modify the system's menus or convert data files.

**LANs in the Real World**

There are several examples of librarians using LANs. Philip Arny (1990), Bio-Medical Library, University of Minnesota, manages the biomedical library's microcomputer lab in the Learning Resources Center. The center has two networks—a Macintosh network and an IBM token ring network running PC-LAN. They still circulate program disks for their Apple IIs, but almost all of the other programs in their collection are loaded on the appropriate network and are available through a menu system. They circulate startup disks (just operating systems) for the Macs but no disks for the PCs. The startup disks for the Macs boot the Mac and load the appropriate program.
Dudee Chiang (1990), information specialist in the Norris Medical Library at the University of Southern California, reported that their IBM PCs are all connected by a LAN, and most software is loaded on the LAN. Access to software is controlled by a menu system. Kibirige (1987), in a nationwide survey of 600 libraries and information centers, found that "the number of libraries and information centers which are already using LANs is relatively small (18.6 percent).... However, 45.5 percent of the sample have definite plans to use LANs. A considerable number of institutions are in the middle of negotiations with vendors" (p. 10).

In order to stay abreast of innovations in hardware and software, librarians need to keep current with computer literature. Joining local computer groups and/or attending conferences and workshops dealing with the latest in computers, software, and networking is essential.

**Security Issues**

Making software available in the library whether by floppy disk, hard disk, or LAN creates a number of potential security issues. A great deal of literature has been written on security for microcomputer systems and software, but the majority of the writing has been aimed at the large systems, such as online catalogs, or use of CD-ROM stations. Until now, library literature, on the whole, has not really reflected on security issues for individual PC workstations where the patron has freedom of access to all the programs on the hard drive, nor on security for the individual computer program which a patron may check out for use elsewhere.

For information dealing with individual workstations, Koga (1990) writes a clear and concise article related to security and microcomputers made available to the public. In it, he discusses types of security problems, such as illegal copying of software, stolen or damaged microcomputers, corruption or deletion of files and directories from hard disks, and the storing of unwanted patron files to the hard drive. The greater part of the article covers common sense, low cost remedies for handling security problems such as the use of physical locks, boot protection, utility programs, and back-ups. As a bit of final advice, Koga suggests that: "A great deal of judgement must go into your security plans; one must weigh the possible risks with the resources available. Your plans for security may be a combination of healthy paranoia, common sense, and lessons learned the hard way" (p. 68). Another form of security is that related to regular maintenance and noted by Ives (1989). "Scheduled maintenance consists of those steps or tasks taken on a regular basis to ensure hardware, software, and data safety and integrity" (p. 30).
Ives includes not only a comprehensive maintenance plan in his article, but also a checklist of procedures to be followed when conducting a regular maintenance schedule. He provides copies of a microcomputer testing/evaluation maintenance form and a printer/maintenance/repair form that are used at The University of Missouri-Columbia Libraries. Ryland (1989) clearly articulates the need for security by noting: "We must continue what we have been doing all along in establishing (and regularly monitoring the effectiveness of) reasonable security measures. We must emphasize the importance of ethical conduct with regard to the use of computers and networks..." (p. 13).

**Viruses**

The Brain, WDEF, Jerusalem, nVir, and Peace appear to be the latest in video titles to hit the open market. Instead, they are a series of viruses that can cause minimal to severe damage to a user's data files or to a library's hard disk drive. A great deal of literature has been written in which users are warned against viruses, are offered remedies for fighting viruses, and are made to feel terrified that they may be the next victim of an unknown virus attack.

It is important to realize that computer viruses do abound; they can be very expensive to eliminate; anyone who uses a computer can acquire them (often without the person's knowledge); there are programs in existence which can both warn against virus attacks and help to repair some, if not all, the damage a virus can cause; and yes, in rare instances, even a commercial disk still in its shrink wrap can be contaminated when purchased from a dealer.

Good overviews of the virus problem are offered by Marmion (1990) and by Coffey (1990). Marmion presents a brief history of early viruses, discusses various virus-detection programs, and relates the interesting story behind the AIDS Trojan which caused computer problems for such noted institutions as the London Stock Exchange and the British Ministry of Defence. Coffey (1990) provides readers with a concise definition of a computer virus as "an agent of infection, insinuating itself into a program or disk and forcing its host to replicate the virus code" (p. 91). He defines worm as "a single program (or group of programs) that operates independently. Worms simply move through files, leaving trouble in their wake" (p. 91). A Trojan Horse is described as that which "is generally considered the program or programming code that carries the worm or virus to the unsuspecting recipient" (p. 91). Coffey offers tips on keeping a computer virus free. Trojan horses, worms, and computer viruses do not, as Coffey points out, all act in the same way to infect a computer.

Chess (1989) defines a Trojan horse as a program that does "things
that the program author intended, but the program user did not” and a worm as a “Trojan horse program that spreads by sending itself across networking connections without the knowledge or intent of the user or the system owner” (p. 142). As to the definition for a computer virus, Chess (1989) defines it as:

another, related, type of integrity threat. A program which is infected by a computer virus contains Trojan horse instructions of a particularly insidious kind; when executed, the Trojan horse code locates one or more as-yet-uninfected programs to which the executing Trojan horse has write access, and inserts itself into those programs, in such a way that they are now also infected. (p. 143)

Pamela Kane (1989) offers readers some interesting ideas on the subject of viruses in her book, *V.I.R.U.S. Protection: Vital Information Resources under Siege*. It is an easy book to read with helpful information for the beginning, as well as the advanced, computer user. Roger F. Aucoin is also an author that librarians should be well acquainted with for help in handling viruses. He is the author of “Guarding Against Computer Viruses: Some General Precautions” (1989a) and “Computer Viruses: Checklist for Recovery” (1989b). In the first article, Aucoin offers a list of fifteen measures a computer user should follow to avoid a virus attack, and in his second article he offers a checklist of twenty-three steps that will guide the user “through an orderly recovery process” (p. 4). Stefanac (1988) offers a sensible overview on the history, identification, and elimination of viruses on the Macintosh. She also provides the reader with a clear definition of a Trojan horse, a worm, and of viruses.

There are a variety of programs that can defend against a virus. One of the more popular ones is *Disinfectant Version 2.5* released in 1991 and developed by John Norstad at Northwestern University. The program’s main goal was to provide a workable solution to the Macintosh virus problem at no cost to the user. It provides the user with detection, repair, protection, and education. The author has given permission to make and distribute copies of this software free of charge as long as it is not for profit. *Disinfectant* is distributed electronically, and when new viruses are uncovered, the author can usually, within a few days, release an updated version of the program that will recognize the new virus. Since it is not a commercial product, there is no support for the user. However, it is suggested that a person join either a user group, a Macintosh electronic bulletin board, or subscribe to a commercial online service if they wish to continue to receive updates on the program. Those who do not have access to one of the above services can send a self-addressed stamped envelope and an 800K floppy disk to the author at Northwestern University, 2129 Sheridan Rd., Evanston, IL 60208.

*Symantec AntiVirus for Macintosh (SAM)*, with its accompany-
ing program Symantec Utilities for Macintosh (SUM II), is another leader in the field of virus protection. SAM will scan and eject any infected floppy disk that may be inserted into a Macintosh computer as well as scan any file folder, volume, or file server to identify existing viruses. If a virus is identified, SAM will repair infected files. SUM II is for data recovery and disk management.

For use with IBM or IBM compatibles, Viruscan, a shareware product, comes highly recommended. The program indicates the specific files or system points that have been infected and identifies the virus strain which has caused the infection. Corporate site licenses are required for corporate, agency and organizational use. For site license information contact: McAfee Associates, 4423 Cheeney St., Santa Clara, CA 95054. Viruscan works only on stand-alone PCs. For Local Area Networks, Netscan, which is not a shareware product, is recommended.

The best protection for your files and hard drive is to be prepared should a virus invade your system, and the best way to be prepared is to constantly back up your files, and to perform regular maintenance. Be sure, however, that your backup files are free of all viruses, and that original master disks are kept in a safe place and used only for making working or backup copies.

COPING WITH DISASTERS

As decisions are formulated and policies established, it is also important to plan for the unexpected. Planning for the unexpected catastrophe can reduce wasted time should a liquid, chemical, smoke, or natural disaster threaten a library's software collection.

One of the first steps to take in the planning process is self education about the composition and characteristics of floppy disks (Osborne, 1989). Once familiarity with the use of disks has been obtained, policies for salvaging disks damaged by spilled substances, unexpected water leaks, or smoke damage can be written. It is beneficial to incorporate these plans into a library's overall disaster/recovery plan so that all staff members are aware of the appropriate procedures to follow.

One of the most common types of disasters to befall a software collection is water damage. Such was the case in the early morning hours of June 19, 1986 at the Mankato State University library in Minnesota when a water pipe burst in the ceiling above the technical services area. Waiting to be processed in open boxes were fifty-five issues of the microcomputer serial, "Softdisk." Water filled both the boxes and the plastic jackets of the disks. Because staff were knowledgeable about disk manufacturing and knew that disks have a cloth-like lining inside the black plastic sealed jacket which absorbs
moisture, staff members tried an experiment to save both the damp and dripping wet disks. Using a portable hair dryer on the air setting (no heat), the damp jacket linings were dried. Those disks which were dripping wet were peeled out of their plastic sleeves and wiped clean with lint-free rags and hung for further drying. Care was taken to keep the disks from touching each other or other materials. The dry disks were cut open, removed from their plastic covers, slipped into dry covers, run, and successfully copied. By using this method, the entire microcomputer collection was salvaged (Olson, 1986a, pp. 634, 635, 636; Olson, 1986b, p. 15).

Physical damage, other than that created by water, can often be the result of bent or dented disks. Again, the key to the salvage operation is an understanding of how disks are packaged, the careful removal of the disk from its protective plastic jacket (e.g., cotton gloves to eliminate fingerprint marks), and the insertion of the disk into an undamaged jacket so that it can freely rotate. Test the disk and, if working, make a back-up copy for everyday use (Cammarata, 1989, p. 8). "The twin threats of human and mechanical damage" often require that back-up copies "become a necessary adjunct to a [software] collection" with the back-up used for circulation purposes (Talab, 1987, p. 36). "As long as the original is stored (i.e., archived) and only one copy at a time is in use, there is little likelihood of an infringement action" (Stanek, 1986, p. 51).

Fire damage can also present special challenges for software collections. After suffering extensive fire damage to a disk collection, one library recommends the following precautionary steps (Riffel, 1990, p. 110):

1. Keep back-up copies and an inventory list (on disk and in hardcopy), in a fireproof vault away from the user site.
2. Make a videotape of the software collection to document losses for insurance purposes.

Damage caused by spilled food, beverages, and other substances can also affect the performance of floppy disks. As with water damage, disk jackets can be carefully sliced open and the substance washed off with lukewarm running water. For greasy substances, disks can be washed with mild soap and water, blotted with paper towels or air dried, reinserted (right side up) into their disk jackets, run, and copied (Osborne, 1989, pp. 9-10).

**Preservation Issues**

It is advisable to include general handling, security, and preservation issues in written software policies. Basic procedures such as securing disks with write protection tabs to prevent data alteration; including care and copyright labels to paper sleeves and packages;
installing a batch file on each disk informing users of proper use, ownership, and copyright regulations; requiring users to return disks to circulation desks, not to book drops; and requiring staff not to expose disks to theft detection or desensitization equipment are all useful steps.

Staff should also be made aware that the improper care of electronically produced data can lead to the active and passive destruction of data (Cribbs, 1987, pp. 15-16). Environmental settings for using and storing disks should be periodically reviewed since they can have daily and long-term effects (National Bureau of Standards, 1983). Lack of proper archival practices and exposure of disks to heat, sunlight, moisture, dryness, magnetism, and dust can all contribute to loss of data. Libraries have found it convenient to store disks both in their original packages (with documentation) on shelves or in drawers, or repackaged in hang-up bags or folders with minimal documentation (instruction cards, templates, etc.) and manuals stored separately (Madden, 1987, p. 89). Local conditions and loan periods will influence the best method to choose. Whatever the decision, it is wise to keep in mind preservation, safety, and protection factors.

**Related Issues**

In addition to the circulation, security, preservation, and other issues that have already been discussed, there are additional tangentially related matters that deserve consideration. These include the role of related computing centers and the organizational structure of that relationship, physical plant considerations, and budget considerations. In discussing software circulation issues it is important to note that there are certain situations and environments where the software may be accessed in settings outside the library. An early study done in 1984 by the R. R. Bowker company showed that two-thirds of the libraries surveyed made microcomputers available for their user clientele. The study also showed that 59 percent of the libraries loaned software primarily for on-site use (Mitchem, 1985, pp. 426-33).

One trend has emerged, particularly on college and university campuses, for academic computing operations to assume responsibility for operating microcomputer labs and lending software. In institutions of higher education, the library's role in providing its patrons with access to software and microcomputers is becoming limited. Preliminary results of a survey of over 150 libraries in four-year colleges reveals that only 11 percent have responsibilities for, or include within their facility, a microcomputer lab. The survey, however, did not address the question as to whether or not these
libraries circulated microcomputer software for use at other locations outside the library (Walch, 1990b).

**Library and Computing Center Relationships**

It should be understood that in the college campus environment there is normally a separate organizational structure that is responsible for computing activities. Such computing organizations are normally divided into two separate sections. One section generally focuses on meeting administrative computing needs and another on meeting the instructional or "academic" computing needs. It is this latter unit that most often is charged with the responsibility of making microcomputer software available for the college or university community. The way this is done varies according to campus tradition and structure. For example, the academic computing unit may take full responsibility for establishing microcomputer labs and circulating software for use within the labs; on other campuses the library may assume that responsibility. Frequently, however, there is a combination where the campus computing organization assumes responsibility for providing and maintaining hardware located within the library and the library assumes responsibility for circulating software. A variety of other cooperative type scenarios also exist.

In developing a working relationship with the campus computing organization, the library needs to exert some thought in determining the organizational structure and relationship that should exist between itself and the computer organization. During the mid to late 1980s substantial discussion occurred both in professional meetings and in the literature regarding the convergence of the library with the campus computing organization. Such discussion was based on, among other things, the interdependency of these two units as exemplified in access to microcomputer labs and software. Clearly this kind of rationale is thin and by itself does not merit sufficient cause for merging libraries with computing organizations. A number of individuals have written on this topic, most notably Richard Dougherty (1987), former president of the American Library Association. He stated:

> The prospect of mergers may make for fascinating cocktail conversation at conferences and will certainly keep electronic mailboxes full, but speculations about mergers and absorptions only cause us to continue focusing on the wrong issues....The attention of librarians and computing center professionals should not be focused on the rhetoric of mergers and takeovers but on the roles their respective organizations can play as the principal providers of information to campus communications. (pp. 289-90)

In keeping with Dougherty's perspective, Woodsworth and Williams (1988) discussed the inherent tensions that exist between
the library and computer organizations. They stated:

Notwithstanding sound agreements, tensions are inevitable in any partnership or working relationship between two units that are interdependent or in which one relies on another for service. At the operating level, this can result in poor system performance. At the management level, it can continue the clash of two cultures which have had an approach-and-avoidance relationship for years. This is not easily overcome, because the two have historically different service missions, staff with disparate foci and skills, differing paces and styles of adapting to change, and a lack of understanding of each others' missions and operations. (p. 88)

Suffice it to say that it will be critically important to establish a clear and appropriate working relationship between the library and the computer organization if there are to be shared responsibilities.

**Physical Facilities**

Space is nearly always at a premium in libraries. Though allocating space for software may not pose an insurmountable problem, the space it does take normally comes from high use, closed stack areas. That is, most libraries find it necessary to shelve software, with accompanying documentation, in a controlled stack area that is already in high demand for assorted needs. A related concern also deals with space requirements for hardware if the library chooses to make microcomputers available for their software collection. Unless one has the good fortune to plan and build a new library facility, space may have to be “made” within the current confines of the library. This may be at the expense of already limited seating or stack space.

Recommendations vary for the number of square feet required for microcomputer workstations, and frequently standards do not address space requirements for microcomputers. For example, the ULS (1989) “Standards for University Libraries” simply states that, “the library should provide...space for study and research...” (p. 683). There is no indication of a specific square footage recommendation. The ACRL (1986) “Standards for College Libraries” state that, “each study station shall be assumed to require 25 to 35 square feet of floor space, depending upon its functions” (p. 197). The document does not address microcomputer workstations per se. While the ACRL (1989) “Standards For Two-Year College Learning Resources Programs” elaborates on the need to consider space planning for computer workstations, they do not specify a square footage recommendation (p. 504). Similarly, *Information Power: Guidelines for School Library Media Programs* makes no recommendations regarding space for microcomputer workstations. Those that have addressed the matter more directly include Raymond M. Holt (1989)
who authored *Planning Library Buildings and Facilities*. He recommends allowing 25 to 35 square feet for "personal computer with printer on table or desk" (p. 210). The California State University (1990) has also provided very specific recommendations related to space requirements for microcomputer workstations. Their specifications state:

The LTCW's (Library Telecommunications/Computer Workstations) are to be provided at the rate of 10% of the total Reader Stations permitted by library formula. For example if the library is permitted 2,000 reader stations then 10 percent, or 200, are to be designated LTCW's. These are calculated at 49 ASF [assignable square feet] per seat. These workstations require more space than other library reader stations because of the equipment and the work space needed to accommodate additional forms of information such as books and periodicals used in a library environment. The LTCW's contain an aggregate of electronic library equipment that permits the student to access and examine different formats of electronically accessed information. (p. 7)

In addition to space requirements, substantial thought must be given to making the space suitable and equipping it appropriately for microcomputers. Much has been written on this and it is not the intent to detail here the wealth of information available. A sampling, however, of the various considerations that need to be made would include the following:

1. Space should be provided "above the ceiling for pulling shielded data transmission cable" (Boss, 1987, p. 105).
2. "Finished columns should include a blank duct...for the pulling of data transmission cable." Avoid power poles as much as possible (Boss, 1987, p. 105).
3. Furniture should be placed close to columns to permit concealment of wiring (Boss, 1987, p. 105).
4. Lighting should be glare-free (Corbin, 1988, p. 89).
5. Microcomputers should be spaced at least three feet apart and so placed as to prevent lines of sight between them. In order to maximize the feeling of spaciousness equipment should be placed in parallel (Corbin, 1988, pp. 88, 90, 91).

A refreshing insight to basic facilities issues has been provided by those who worked to develop the Microcomputer Center at the Mann Library at Cornell University. In their conversion and renovation of space, they noted the importance of having diffused overhead light, of surge protectors (by means of a central electrical panel as opposed to each workstation), of carpet designed to prevent static buildup, of specially designed computer furniture that provides ample space for paper and books, and of wide aisles and "elbow room" (Curtis, 1987, p. 8).

As can be seen, planning for the physical facility requirements
can be complex and require the skills and assistance of those who may well be more familiar with space planning, electrical and data-transmission wiring, furnishings, and architectural intricacies than the typical librarian.

**Physical Access by Type of Library**

**Academic Libraries**

Piele (1982) authored one of the first articles on the circulation of microcomputer software, largely based upon her experiences at the University of Wisconsin at Parkside Library. Rather than circulate individual floppy disks, software at Parkside was installed on a 20 megabyte hard disk and accessed through a network arrangement in the library's microcomputer lab.

By the mid to late 1980s, as academic libraries began to add software to their collections, other articles began to appear. Noticeable were concerns about individual disk circulation from the perspective of both the library and the vendor, and any potential copyright infringements (Walch, 1984a. Reprinted in Walch, 1984b); overall implementation issues (Snelson, 1985); the importance of including K-12 and adult-level educational software collections to support curriculum and teacher education institutions (Rockman and Kemp, 1986); and strategies for research libraries to follow to best serve the microcomputer needs of their users within the context of relationships with campus computer center facilities and personnel (ARL, 1986).

The publication of the Association of Research Libraries' (ARL) Spec Kit 123, *Microcomputer Software Policies in ARL Libraries* (Nollan, 1986), clearly indicated that if large research libraries embraced computer software, then other academic libraries could no longer shy away from including software in their collections. With contributions from the Columbia University Libraries, the University of Texas at Austin, Virginia Polytechnic Institute and State University, Johns Hopkins University, the University of California at Riverside, and Catholic University, it was clear that both public and private and large and small research libraries from all parts of the country were wrestling with the same implementation and circulation questions. Of the 105 academic libraries surveyed in December 1985, 38 percent indicated that software circulated.

In late 1989, ARL Spec Kit 159, *Administration of Library-Owned Computer Files*, was distributed. Its intent was broader in scope than the previous spec kit, and included magnetic media formats such as CD-ROMs, bibliographic and numeric machine-readable data files, and computer programs, either accessible in the
library or through the campus network. The small sampling of respondents (twenty-eight of thirty-four libraries) indicates that these materials are not yet widely found in libraries. When owned, access is typically within the library only (Shaw, 1989, p. 11).

In addition to comparative use articles, individual case studies of library experiences also appeared during the latter part of the 1980s. The American Library Association commissioned the Mann Library at Cornell University to write the book, \textit{Public Access Microcomputers in Academic Libraries} (Curtis, 1987), which was a collaborative effort of nine librarians from the library's Microcomputer Center which opened in 1984. The "Software Circulation and Patron Support" chapter indicates that software accounts for approximately 10 percent of the library's total circulation, with software on reserve raising this figure to 20 percent (Madden, 1987, pp. 89-91). High use software placed on reserve poses special challenges. As a result, staff have developed a separate software reserve policy and make every effort to see that professors include adequate documentation and tutorial materials with their reserve placements.

The experiences of the University of Florida Libraries were published in 1988 after the completion of a two-year study of local software use. Florida librarians developed policies useful to both branch libraries and to the main campus library. Florida librarians recommended that:

Circulation policies for software should be much like that for other library materials, dependent on content, format, and anticipated use as well as hardware requirements and restrictions. Software may be used in the library if hardware is available, or checked out for use elsewhere. Circulation should be subject to contractual arrangements as well as existing library policies. (Beaubien et al., 1988, p. 665)

That same year, \textit{Developing Microcomputer Work Areas in Academic Libraries} was published (Uppgard, 1988). It contained the diverse experiences of six academic libraries, large and small, some with branches and others as the single campus library. Of particular note is the excellent annotated bibliography pertinent to issues affecting academic libraries.

\textit{Public Libraries}

In many ways, the experiences of public libraries parallel those of academic libraries. A 1984 survey of 900 public library systems conducted by the United States Office of Educational Research and Improvement (OERI) reports that nine out of ten libraries that provide computers also loan software for use in and out of the library building, with a typical loan period of one week (OERI, 1986, p. 1).
The experiences of a large urban library, the Minneapolis Public Library, and a small suburban library, the Liverpool (New York) Public Library, are typical of many others. Circulation policies may reflect two distinct categories of patron needs—short term for games and preschool programs, and long term for word processors, data management, and the like (Smisek, 1985, p. 108). Usage or overdue fees can conform to existing policies for other media materials. Core collections can be maintained at each branch in a multibranch system, or the software collection can be centralized at one location.

At the Minneapolis Public Library, software is circulated at two specific service points, the Science and Technology Desk or the Children's Room Desk. No borrowing fees are charged and the loan period is one week. Returned programs are inspected only in response to user complaints. Since the software lending program was established, only seven out of 1,100 disks were returned damaged, and the library absorbed the cost of replacement disks (Smisek, 1985, pp. 108-09).

In contrast, the Liverpool (New York) Public Library circulates software only from the main circulation desk. Due to collection growth, small amounts of damage, and limited staff time, the library no longer boots each piece of returned software (Polly, 1986b, p. 152) but does check to see that all items have been returned (Polly, 1986a, p. 22). Software returned without a disk or manual (all manuals are photocopied and the original circulates) is subject to a fine of one-half the program cost, and patrons who fail to return a program must pay the full replacement cost. Circulation periods are one week with a limit of three titles.

School Libraries

The challenges facing school libraries often involve stretching their budgets to include programs for both students and teachers in a single classroom or within a school's multi-use computer lab. The needs and practices of public school libraries, private school libraries, and school library systems can also influence how software is handled (Camerman, 1986, p. 1).

With only one librarian and no clerical staff or student assistants, the Northwestern High School library in rural Maple, Wisconsin, was able to serve its 450 students with up to eighty software titles by implementing a simplified approach (Murphy, 1988, p. 132). Materials are repackaged into hardcover notebooks with three-ring plastic disk inserts, and software is limited to use in the library for a one-hour period.

In contrast, once the Del Ray School library in wealthy Orinda, California, gained $10,000 worth of software through its grant
writing efforts, it enlisted the assistance of parents to staff the software lending library. It also made the software available outside the school to the community at large (a stipulation of the grant) without sustaining any theft or damage problems (Paskoff, 1989, p. 310).

**CONCLUSION**

The rapid proliferation of microcomputers and their accompanying software has made it necessary for libraries of all types to carefully and thoughtfully consider their role in making this relatively new format accessible. Though it is difficult to see how libraries can ignore or delay addressing issues related to such service, there are several matters that must be pondered—not the least of which is that of physical access. Such matters and the impact they have on library operations and services have been outlined in this article. As libraries have confronted and, for the most part, successfully addressed and accommodated the demands required by the microcomputer revolution, it will be important to realize that beyond the horizon lie even more challenges that will arise as new technologies are developed. These technologies will make an ever-increasing amount of information available and will present an ever-increasing number of challenges to libraries. It is clear that libraries will be in the forefront in providing their users with information of all types and in all formats. This was clarified many years ago in a prophetic statement made by Louis Shores (1973) who noted that:

Long before Marshall McLuhan suggested the decline of the print medium, Georges Duhamel wrote, in *In Defense of Letters* (1989) that the defenseless book would be supplanted by “less laborious methods of information and recreation.” Dissenting from the opinions of both Duhamel and McLuhan, I urged my librarian colleagues in colleges and universities, while I was chairman of the ACRL Audio-Visual Committee, to reject this defense complex and to recognize that all formats are part of the generic book. As such, they should be selected and acquired, as well as processed and disseminated, without condescension. (p. 93)

The recognition of computer software as part of the generic book as well as other evolving formats is important. Making them appropriately accessible to the library's clientele is an equally important issue.

**REFERENCES**


Chiang, D. (1990). *Public access computer systems forum*.[Electronic mail posting] PACS-L@UHUPVM1.BITNET.


City University of New York, Queens College Graduate School of Library and Information Studies. (ERIC Document Reproduction Service No. ED 301 211)


Copyright and Other Legal Considerations in Patron-Use Software

R. S. Talab

When you are working on the cutting edge of technology, the all-important thing is to stay behind the blade.

—Haines Gaffner

Copyright and Technological Change:
Hearings Before the Subcommittee on Courts, Civil Liberties, and the Administration of Justice (1983)

ABSTRACT

The area of new technology in copyright has been justly called "a swamp" (Kastenmeier, 1989). Patron-use software and other media present practical usage issues involving both copyright and vendor contractual and license issues. Luckily, case and statutory law in the last few years has helped make a better map of library and patron rights and obligations.

The Vault case (Kemp, 1990) has helped to better define the use of backups, copy programs, federal preemption of state "shrinkwrap" copyright law, and user adaptations of licensed programs, and brings into question the issue of undue rights of the software producer. Other case law has indicated that contracts which enlarge a copyright owner's rights must be balanced against the public good. In those cases where exemptions 107 to 118 apply, the more likely the courts are to balance these exemptions against the rights of copyright owner.

INTERPRETING COPYRIGHT LAW

This article will give two basic "rules of thumb" for interpreting copyright law, examine the latest developments in copyright case
law, discuss several issues that apply to patron-use software in light of these developments, and then analyze the status of newer technology such as electronic bulletin boards and compact disks.

Generalization of copyright policy is hampered by the staggering variations among library types in materials, licensing, and contracts (Talab, 1986, p. 28). For example, a database program used for legal students in a law library is licensed for the purpose of having students copy information to a disk. A database such as this does not exist in the school library except by special licensing. Books with diskettes are typical in academic libraries but are rarely found in public libraries. Several educational software producers' licenses allow up to two copies of one microcomputer program to be used in a total of three machines for school use. This exemption does not apply to corporate libraries. Because of these variations, pertinent copyright law will be interpreted for libraries only in the most general way.

**A Basic Rule of Thumb**

In considering copyright information given in this or other contexts, one should keep certain basic tenets in mind. "Fair use" (Section 107 of the Federal Copyright Act), a judicial doctrine of over 100 years duration which applies exemptions for the purpose of "teaching, scholarship, criticism and comment" provides four basic criteria in determining whether a use is exempt from copyright: (1) the purpose of the use, (2) the nature of the work, (3) the amount and substantiality of the work being used, and (4) the effect of the use on the copyright owners' (real or potential) market (U.S. Congress, 1976). In general, a "fair use" is considered a "de minimus" (negligible) use (Cohen, 1955).

Legal scholars have pointed out that the first three criteria are used merely to ascertain the fourth criterion of market effect, which is the primary consideration in infringement cases (Kemp, 1990). If this is so, then viewing the nature of the work and its use on a sliding scale from profit to nonprofit helps to better determine the degree to which a certain exemption might apply to a particular library type. For example, a nonprofit (educational) use of a nonprofit (educational/scholarly) work is considered differently than a profit (business venture) use of a profit (business venture) work. In general, when profit enters into a determination, then "fair use" is reduced. This explains the great disparity in licensing, photocopying, and other charges for materials used in a corporate library from those in a school library media center. Applying this slide rule will aid in determining the applicability of "fair use" to a library type.
NOT ALL PRODUCERS KNOW COPYRIGHT LAW: A CAVEAT

Software licenses vary greatly. The well-meaning producer may be more unfamiliar with the copyright act than is the well-meaning librarian. Large companies that produce a great deal of off-the-shelf computer software usually have the greatest lenience in their licenses (Talab, 1984). Some companies’ licenses state producers’ rights that are more strict than the copyright act allows. For example, a license may state that no archival copy may be made. This restriction directly violates the Computer Software Amendment as it is interpreted today. The amendment states that the user may “make or have made” an archival copy for the purposes of protection against human or mechanical failure, yet several licenses have this statement (Copyright Law Amendment, 1980). Application of a well-known phrase of the past few years should be put into effect—“trust but verify.”

Copyright Case Law: Vault Corporation versus Quaid Software Ltd.

In the case of a software protection program, the producer claimed copyright infringement and breach of license agreement against a software producer whose software unlocks the protection program. The court decided that the defendant’s copy program neither infringed the plaintiff’s copyrights nor breached any licensing agreement between the parties. In so deciding, the court determined that some aspects of a state “shrinkwrap” statute protecting software producers were preempted by the Supremacy Clause of the Federal Copyright Act.

Vault produced computer disks imprinted with a program which protects the disks’ contents from being duplicated in a usable form. Its purpose is to prevent unauthorized copying of programs reproduced on a Vault disk. Quaid produces and distributes computer disks imprinted with a program that unlocks Vault’s protection device thereby permitting the entire contents of the Vault disk to be duplicated. Commentators have noted that this decision is a departure from past decisions which “follow the path of protectionalism” for software producers (Kemp, 1990).

Several salient points from this case apply to patron-use software in libraries. The Quaid CopyWrite disk validates the use of copy programs in order to unlock other programs to produce an archival copy even if the producer states in the license that a copy may not be made. This is not a breach of the licensing agreement. However, use of a producer’s backups, if supplied at a nominal fee, is suggested because these copies are usually free from bugs that can be written into a program to discourage copying.

Under the “first sale doctrine” (Section 109), the copyright holder may market copies of the work by methods other than an outright
sale and the copyright holder may, by contract, place restrictions on future disposition of a sold copy. The doctrine states that the privileges described as pertaining to the owner of a copy of the work do not extend to a person who has acquired possession of the copy by rental, lease, or loan. The Legislative Report acknowledges that the copyright owner's cause of action is not for copyright infringement but for breach of contract (Kemp, 1990). The validity of that contract depends on whether or not the contract enlarges the scope of the copyright owner's rights beyond the Copyright Act. If it does, then it is doubtful if it is enforceable (Paetzold, 1989).

Louisiana, the state in which the case was tried, has in force the Louisiana Software License Enforcement Act (SLEA). The court determined that the SLEA was preempted by the Federal Copyright Act thus invalidating the state act. By implication, all mass-marketed license agreements are invalid as preempted by federal copyright law. The Vault decision brings into question just how far a producer may extend copyright protection at the expense of advancing technology.

What are Producers' Rights?

The understandable dilemma for software producers is to encourage sales and discourage piracy. "The rule of thumb in the software industry is that at least one unauthorized copy exists for every authorized [copy]" (Neumeyer, 1989). The industry has responded to this with the establishment in 1984 of the Software Publishers Association (SPA). The association has since grown to over 350 firms in an attempt to protect software at the national and international levels. Other organizations formed for this purpose include the Association of Data Processing Service Organizations, the Association for Copyright Enforcement, and the American Copyright Council (Neumeyer, 1989).

Producers are relying increasingly on trade secret protection, patent protection, and hardware/software protection devices, such as access locks, game cartridges, key diskettes, hardware locks, registration, and tracking of serial numbers because of the failure of standard copyright protection.

While software producers should write licenses that protect their product to the furthest degree, this protection does not extend to users' forfeiture of rights reserved or granted to them in sections 107 to 118 of the act. Therefore, if the license is for a standard mass-marketed program with a shrinkwrap license, then prohibitions should be invalid such as: (1) not being able to make an archival copy, (2) not being able to loan the program as part of a library service, (3) not being able to make adaptations necessary for running
the program, and (4) not allowing borrowers to make adaptations in order to run the programs. However, in libraries where it was the case of not allowing borrowers to make adaptations, it would be wise to make a new loan copy each time it was lent in order to ensure that the program was free of these adaptations that may interfere with the next person using it.

ISSUES FOR PATRON-USE SOFTWARE IN LIBRARIES

Barbara Quint (1989) asks several questions about patron software circulation in an article entitled “Let the Buyer be Wary.” The following are her questions with this author’s answers:

1. **What impact do all these (license) regulations have on library operations and service to the patron?**

   As discussed earlier, the library may make an archival copy of any program that it possesses using a commercial copy program even if the copyright owner has a “lock” on it. Utility programs, which are designed to be used to build programs, would perforce need to be copied in their original state, possibly each time they are lent out, so long as the intent was not to make another copy but merely to clean up the original disk. Software “locks” should also be placed on them.

2. **What responsibility does the library staff have to enforce the provisions of these license agreements in the case of books with disks?**

   Some license agreements are unclear for various reasons—sometimes deliberately—but in most instances it is because the producer could not imagine all the usage possibilities that could exist particularly within libraries. Quint (1989) gives an example of a license whose first provision was that the buyer was authorized to “use the software specified below only on a microcomputer located” within their own facilities. She questioned the extent to which “facilities” could be applied:

   a. **Within the library? Yes. Can it be used within the college or university?** No. A site license would be needed. **Can it be used within the multicampus system?** Absolutely not without a site license.

   b. **Does it mean one machine at a time, or one machine only?** It means one machine at a time.

   c. **Can the machine be connected to a local network that supports more than one user?** No. A network license or permission must be obtained.

   d. **What happens if the user replaces the machine—does the user have to buy a new software copy?** No, unless a machine requires a different operating system, in which case the software would
not work very well anyway so a new copy would have to be purchased.
e. *What if the user buys a new type of disk drive? Can the software be transferred to the new disks that fit the drive?* Transferring a program from one disk size to another, without creating a new derivative work as prohibited by law, would be feasible. However, there are some caveats:

(1) A simple format change of the same operating system, such as transferring a program from a 5 1/4" floppy to a 3 1/2" disk for a portable computer or to accommodate a PC owner's drive size, is fine, since the new product is not intended as a derivative work. Many computers now have both sizes of drives. However, both sizes of the same program cannot be lent at the same time; only one copy can be lent at a time.

(2) Obviously, this would not be possible for changing from an Apple IIE format to an older Macintosh format.

g. *Does the user have to write the publisher for new copies in another disk format?* No, the library is responsible for this.

h. *What if the publisher does not have the right size?* This situation is hard to imagine, but the library has the option of asking permission to make a copy in the needed size and only lend out one size at a time or purchasing another copy and then lending out both at the same time.

3. **What rights and obligations do the publishers assume beyond the initial sale?**

Generally, publishers will replace faulty disks and may offer upgrades of a program. They have an obligation to ensure that the product is in working order and that all additional manuals, documentation, etc., are present and usable. By virtue of licensing a program rather than selling it outright, publishers retain greater control of the program. This explains why over the years producers have stopped selling programs and instead have turned to licensing. According to the Software Copyright Amendment (P.L. 96-517), the producer cannot hinder the user from making a backup copy of the program or making a backup copy of the documentation, all of which are intended for archival purposes only. Also, because of the first sale doctrine (Section 109) the lessee may rent or lend the copy.

4. **Are there any differences between classes of companion software [disks that come with books]—e.g., program utilities versus instructional materials?**

Yes, there are differences. The Copyright Law allows greater latitude in the use of programs which are compiled, rather than written, such as most databases. If the database itself is public
domain—often noted in the book or on the disk by the absence of a c—then public domain software may be freely used. If the disk is specially written for this book, then it is subject to the same restrictions as that book. Sometimes the publisher will indicate how the disk is to be used, and this use will go beyond the law. The general rule is if it says you can do it and it is more lenient than the law, you can do it; if it says you cannot do it and it is more restrictive than the law, then it is possible that you can do it.

Other considerations must be taken into account. Lending $400 programs (supposedly so costly because of their power and general use possibilities) would understandably cause a producer to scream "ouch!" if these programs were lent irresponsibly. "How can they be handled responsibly?" one might ask. Program locks can be placed on the programs by the library staff using commercial software, but, in most cases, producers of such expensive programs put their own locks on. It is also obviously unwise to lend copy programs. General utilities, databases, spreadsheets, integrated programs, and the like could be used in the library only if the library supplies computers for this purpose. Several academic libraries acquire a network license for programs that have files which generally leave much to the librarians to "clean up" afterward. By placing these programs on a network, the files can be deleted for the next user or the next day. This method, when applied to high cost utility programs, is the safest and easiest method of loan. If a library loans many expensive programs, it makes sense that the library has funding for patron-use microcomputers as well.

Typically, when a type of program is relatively new, such as books with microcomputer disks, the licensing structure can be either too loose or too rigid, and it may not anticipate all the use possibilities. This situation occurred with the first compact disks on the market. The average license was just a paragraph because general use policies could not be predicted (Talab, 1989). Now the average license extends from one page all the way up to several closely printed pages because some general use policies have been identified. Further changes in use policies will necessitate newer licenses. This is the way the market works. While the license for the use of these materials should be read thoroughly, common sense should prevail, and no statements that one does not agree with should be signed.

5. Does the issue of public domain software affect specific situations?

Since public domain software is by definition not copyrighted, it can be freely copied. If a book comes with a public domain
disk, then this disk may be freely copied. "Shareware" is different. Most (but not all) shareware is not copyrighted. Instead a "registration fee" is requested either for a more complete user's guide, or documentation, or updates, or in order for the recipient to merely be able to use the software adequately. The Boston Computer Society, the Berkeley Mac User's Group, the PC Shareware Exchange, Educorp, Softswap, etc., all have good to excellent shareware and public domain software. However, since some shareware is copyrighted in among the public domain programs listed in a catalog, it is best to read the license that comes with it. Quite often the shareware producer asks that the first program be paid for and all others may be copied freely. Other times the program must be treated as any other copyrighted program, although it is much less expensive. Since there is so much poor shareware, the quality is variable. Public domain and shareware programs are excellent for general checkout purposes (Schack, 1987).

**Electronic Bulletin Boards: New Developments and Telefacsimile**

In some libraries, electronic bulletin board systems (BBS) are used or operated. There are an estimated 3,500 to 4,000 of these electronic bulletin boards (Cangialosi, 1989) in the United States. Although most are privately run, large commercial boards have grown which offer a vast array of services at an hourly connect rate. The private bulletin board services serve two main functions: i.e., electronic message centers and/or as a software library. The latter aspect of BBSes deserves some attention. Since it is possible to upload files via modem for transfer to another person, the use of BBSes in libraries should be closely monitored. Many pirate BBSes contain, in addition to pirated software, credit card numbers, passwords to systems, and other confidential information.

Copyright signs should be posted on public use computers, particularly if they are within the library staffs control and view. Unsupervised machines, copiers, etc., actually pose less of a witness to any possible wrongdoing. An ironic twist to the law does not excuse neglect. In fact, if neglect of duty is proved, librarians are more liable than if they are just ignorant of the activity (Section 504c).

In some libraries, a fax machine is connected to a microcomputer so that patrons may exchange information, etc., to and from their offices. A fax/microcomputer/modem service should not be provided in the same area where software is checked out, if at all possible. Even so, proper copyright warnings should be posted. This situation
invites the intelligent student/patron to simply transfer files. While this may not be a problem or even a possibility in many institutions, it is a real problem already in highly technological settings.

**The Computer Software Rental Amendments of 1990**

H. R. 5316, Title 8 was passed by the last Congress on October 27, 1990. This bill includes the Computer Software Rental Amendments (S 198 and HR 5498) and will regulate software rental in much the same way that the Record Rental Amendment of 1984 curtailed the rental of sound recordings in record stores. But there are exemptions. For example, if nonprofit libraries and educational institutions are renting, leasing, and lending computer software for nonprofit purposes, this use is exempt. The transfer of possession from one nonprofit educational institution to another would also be exempt. Software lent by nonprofit libraries must bear a notice of copyright, warning borrowers that unauthorized copying may violate copyright law. As of March 28, 1991, libraries are required to have a warning affixed to the package of any circulating software purchased after December 1, 1990. The Washington, D.C. Office of the American Library Association (1991) released the full text of the warning. This amendment will be reviewed in three years from the date of passage (Computer Software Rental Amendments Act of 1990. See also, Henderson, 1990; Flagg, 1991).

**Compact Disk Licensing Issues**

Compact disk licenses vary a great deal in negotiable clauses, printing (including photocopies), downloading, network use, and transmission (Duggan, 1990; Jensen, 1990). Many licenses allow photocopies only internally, while others caution against temporary downloading without defining "temporary." The number of stations allowed on network access can range from two to ten stations for some products up to an unlimited number of stations for others. Some licenses specify the number of photocopies per printout or movement of CD-ROM to another site.

The question many librarians are asking is "How much of this is contingent on the license agreement and how much of this is contingent upon the principle of fair use?" Again, one must be knowledgeable enough to comply with the copyright law but realize that the number of disks per site license, the site license itself, the number of stations, etc., are legitimate legal business that are stated in the site license and include these restrictions by law. This does not preclude the individual library from negotiating on these matters with the producer. This negotiation benefits all parties. The producer becomes more aware of the needs of the library community, and
the librarian may effect a license that is more in line with the library's needs.

The law recognizes the concept of temporary, intermediate, and long-term storage in much the same way that exists for online databases. No cases exist for compact disks at this writing. Temporary storage could mean saving files to disk for perusal at a later date and then discarding them or transferring them to print. Intermediate storage is the most difficult to classify. It can consist of storage within a unit or department for a month or longer without the intent to save indefinitely. Long-term storage would, for practical purposes, be indefinite. Temporary storage has simply not been addressed in any meaningful way for compact disk products. However, most temporary storage, according to previous case law for computer programs, by extrapolation, would fall within fair use.

The number of files that can be downloaded has been addressed by the courts in a most broad and relatively unusable manner for libraries in regard to online services. Downloading of one or a few records is within fair use. Downloading of an entire database is illegal. No one is sure where the line is drawn (Mills, 1989). It seems justified that minimal ("de minimus") downloading of some files for teaching, research, scholarship, criticism, and comment is within fair use regardless of the license agreement. The very real problem, however, is the extent to which the disk is engineered to allow that downloading.

However implausible the contract is, the point the producer is trying to make is not to have customers produce and save searches or hand them out so that the need for compact disk products is diminished. If photocopies are made of a search and faxed to another library or patron therein so that the receiving library does not need to purchase the product then this use is illegal. Use that siphons sales from the producer's market is to be discouraged. Use performed internally or by the librarian for patrons if they were on site would seem legitimate. LAN issues also fall into this area. While LAN uses fall into categories, most producers will not permit remote access without an additional charge (Jensen, 1991). Again, producers are concerned and undecided about the extent of access to their products.

The compact disk market is new. First and foremost, compact disks are not used in a wide enough user base for compact disk producers to have an adequate "feel" for the direction that the market will take. Multiple disks purchased from one producer should indicate negotiation is in order particularly for large purchases. As the user base grows and multiple disk situations become more common, use procedures become more solidified. As both librarians and producers become more aware of the potential of this medium, general use rules will come into being. This is a very political process borne
out of dialogue and bargaining, and it happens in each new technology as it stabilizes. A great deal of discussion is necessary since these products must be encouraged to grow. However, the industry must also accommodate the user base in order to bring this about.

**Conclusion**

The key points for libraries are to maintain responsible lending that does not allow for the possibility of simultaneous users of one program or product; not to sign any statements that one does not agree with; to use prudence in areas which are in dispute; and place copyright statements on all machines, programs, and any accompanying materials to alert patrons to copyright law and to reduce liability on the part of library staff.

Technology drives copyright (Baumgarten, 1984). Congressman Robert W. Kastenmeier (1989), chair of the House Judiciary Committee on Courts, Intellectual Property, and the Administration of Justice, predicted recently that:

> these areas of computer software, databases, and electronic publishing are ripe for congressional oversight and scrutiny. Since the enactment of the Computer Software Copyright Act of 1980 Congress has not held a single hearing on computer software developments except for Senator Hatch's field hearing on software rental...in Utah [in 1988]. (p. 23)

Librarians have succeeded in serving the patron better through lobbying and thereby challenging the public performance issue of videos in public libraries in service to the poor patron, in articulating the notion that librarians are also teachers in the integrated curriculum and therefore are also subject to Section 107 (fair use) exemptions in the schools and in teaching functions, and in lobbying for the right to make archival copies when producers were adamant about not supplying them in the past. There are a host of other issues that require dialogue with producers who are increasingly harassed by piracy, industry competition, and new technologies that cost a great deal to harness and are quickly obsolete. Librarians are the best advertisers that software producers have, and these producers give librarians another reason for existence—materials. It is not a cozy relationship, but it is the essence of the balance between personal benefit and public good inherent in the Copyright Act, and this is the way that it was intended.

**References**


Reference Services and Staff Training for Patron-Use Software

LINDA J. PIELE

ABSTRACT
Libraries developing collections of materials in machine-readable formats have had to determine what level of assistance library staff should and could provide to patrons. Factors considered have included the library's mission, user needs, and staff time and skills. The issues involved in providing assistance to patrons using software programs on diskettes, bibliographic and full-text databases on CD-ROM, and numeric data files on magnetic tape, diskettes, and CD-ROM are explored. The response of libraries to the challenges posed by these new formats has varied depending on the type of library, the type of software, and the organizational environment. These new formats offer libraries opportunities to enhance their services but will require careful attention to staffing levels and training programs.

INTRODUCTION
As libraries have faced the question of whether and when to begin acquiring software for patron use, one of the first issues considered has been the level of assistance that would be provided to patrons. Could users be expected to use these materials independently or would they have questions? If so, what sort of questions? Would they need help just getting started? What if they attempted to use the software and had a problem? Would reference staff be able to answer their questions and troubleshoot software and hardware problems? Would they be able to even instruct patrons on using the software? And if they could do so, should they? Where
would the librarian's role end and that of the computer specialist's or classroom instructor's begin?

Although assisting patrons and instructing them in the use of library materials does fall within Galvin's 1978 definition of minimal levels of reference service (p. 220), helping patrons use microcomputer software could involve librarians in complex questions for which they may be initially ill equipped and could open up a potentially very time consuming new area of service. Furthermore, public service librarians are already feeling over-extended and pressed for time given the pressures to develop and maintain other new services such as bibliographic instruction programs and mediated or end-user search services. Concerns have already been raised about the effect of such stresses on the quality of reference services (Miller, 1984).

In considering these issues, the professional literature relative to patron-use software will be considered as it relates to three subtopics based on content and format: (1) software programs on diskettes; (2) bibliographic and full-text databases on optical disks, generally CD-ROMs; and (3) numeric data files in machine-readable format (initially on magnetic tape but later on diskettes and CD-ROMs). Each of these areas has generated a distinct literature that includes discussions of user assistance and staff training. Although numeric data files (on magnetic tape) appeared in libraries first, it is more convenient to discuss these last due to the way in which they overlap with the other two categories to be considered.

The term reference assistance will be used broadly in this discussion to include almost any type of assistance patrons might need in order to make effective use of library-owned materials. Depending on library size, type, and physical arrangement, this assistance might actually be delivered from a number of service points, including the reference desk, circulation desk, government documents department, instructional materials center, or the library systems office. The actual service provider may or may not be a reference librarian; what might fall to the reference librarian in smaller libraries may be delegated to paraprofessionals or student employees in larger libraries. The term software will be used broadly to refer to anything in machine-readable format whether data file or program.

Although all types of libraries collect software for patron use, the question of what constitutes appropriate levels of reference service appears to have arisen primarily in public and academic libraries, at least in terms of the published literature. School librarians have, of course, published much about the important role they can play in integrating microcomputers into the curriculum, but the appropriateness of this role appears to be taken for granted, as is the maximum level of service generally offered by special librarians.
Thus, although school and special libraries will be included in the discussion, the primary focus will be on public and academic libraries.

**Software on Diskettes: Public Access Microcomputers in the Library**

Libraries started collecting software and making equipment available to their patrons shortly after the personal computer was invented (Dewey, 1986, p. 232). As this new service got off the ground, one of the great unknowns was just how much help users would need and how library staff could respond. In the face of this uncertainty and with a generally low level of staff microcomputer expertise to call upon, public and academic libraries adding this new service tended to adopt conservative service levels. This public library policy is typical of those appearing in early case studies: “A staff member will be available to provide minimum assistance when needed. THE LIBRARY'S ROLE, HOWEVER, IS ONE OF GUIDANCE, NOT INSTRUCTION” (Thompson, 1985, p. 80).

Libraries generally find that patrons need much help, judging from the results of several surveys (Uppgard, 1987, p. 30; Hess, 1988, pp. 87-90; Avallone, 1985, p. 106). Typical of anecdotal reports are these comments: “Booking appointments and helping users with software inundated our reference librarians past the point of exhaustion” (Polly, 1985, p. 13); “users expected an expert to be on hand whenever the library was open” (Julien, 1985, p. 384); “Although we do not want to get too deeply involved in assisting users with their work, we find that they will not allow us to remain uninvolved” (Piele, 1985, p. 6); “Our efforts at purely ‘self-help’ have only kept our involvement limited at a cost to the quality of our service” (Avallone, 1985, p. 106).

Of course, the level of assistance needed by patrons has depended on the number of microcomputers involved, the types of users attracted, their level of computer expertise, and the type of software collected (Thompson, 1985, p. 81; Seiden, 1988, p. 65; Robertson, 1986, pp. 80-81). For example, most computer-assisted instruction programs offer fewer opportunities for creativity and thus require fewer skills than do such application programs as word processors, spreadsheets, and database managers.

Initial policies have often been modified as library staff learned more about their users' needs. Libraries that had adopted a very conservative service philosophy at the outset (we'll show the patron how to turn on the computer, insert the disk, and boot the program, but after that they're on their own) found that it was unrealistic to offer the same level of service for microcomputers as for photocopiers (Reynolds, 1985, p. 190). And as librarians gained self-
confidence in working with microcomputers, they often found themselves able and willing to be more helpful (Piele, 1985, p. 5).

A particularly wide variation in service philosophies developed in academic libraries. For example, in Uppgard’s 1987 survey of academic libraries, sixteen of the forty-five libraries housing microcomputer laboratories reported that support for users had a “significant, time-consuming impact,” while twelve reported no impact. Those libraries reporting no impact (and thus no service) did not appear to have been involved in planning or operating the lab and its services because another campus unit was doing so (p. 30). In discussions held by ACRL’s Microcomputer Services in Academic Libraries Discussion Group, librarians reported service levels in their libraries ranging from fully developed to nonexistent. A frequent comment of librarians from libraries of the latter type has been that a microcomputer lab was “dumped” on their library simply because the library had available space and long hours. (Issues for 1985 and 1986 of the ACRL Microcomputer Services in Academic Libraries Discussion Group newsletter are available from Linda Piele, Library/Learning Center, University of Wisconsin-Parkside, Box No. 2000 Wood Road, Kenosha, WI 53141.) Thus, an important factor in determining the service philosophy of academic libraries may have been the source of the public microcomputers and the role of the library in their supervision.

When responsibility for operating the lab is given to a unit other than the library, such absentee supervision can lead to poorly resolved responsibility for user assistance and situations in which library staff end up assisting patrons surreptitiously. MacLean (1988) suggested that in such cases, rather than asking whether reference librarians ought to help patrons with software questions just as they help them with other library materials, the question should be phrased: “Can reference librarians be expected not to help library users who ask questions related to their use of microcomputers” (p. 22)?

When computer literacy has formed part of a library’s mission, more aggressive service programs, including workshops and consulting services, have resulted (Hart, 1985). Often libraries saw information literacy as their real goal, with computer literacy as a means to that end (Hubbard & Wilson, 1986, p. 15; Davison, 1987, p. 63; Curtis & Lippincott, 1987, p. 108; Piele et al., 1986, p. 376). Cornell’s Mann Library, whose staff contributed chapters on various aspects of its microcomputer services to a book edited by Curtis (1987), demonstrates an especially thoughtful approach to defining information literacy goals and developing extensive services accordingly.

Careful attention to the definition and communication of service
levels can do much to minimize patron and staff frustration (Hall, 1986, p. 341; Reynolds, 1985, p. 190; Dewey, 1984, p. 62). Following are examples of services that might be offered at three levels:

**Minimum**
- showing patrons how to turn the computer on, insert a disk, boot, and exit a program;
- showing patrons how to format a disk;
- suggesting appropriate packages to meet a user's particular needs;
- providing tutorial software on general computer use and on the use of particular packages in the library's collection.

**Medium**
- providing specific answers to specific problems in using particular software packages;
- assisting patrons in performing normal operations of application packages;
- referring patrons to pertinent sections of manuals;
- developing additional documentation for packages that present difficulties;
- providing training workshops for users;
- using utility programs to retrieve lost or scrambled patron files or showing patrons how to use such programs;
- helping patrons transfer files from one software program to another.

**Maximum**
- providing in-depth consulting on use of bibliography management software;
- providing assistance in using patron-owned software that is not part of the library's collection (may include configuring software for library owned equipment);
- helping faculty to author instructional software (Rusk & Eversole, 1985, p. 17);
- evaluating bibliography management software packages and making evaluations available to the campus community (Chiang & Stewart, 1987, p. 169).

It might be assumed that as library patrons become more skilled in the use of computers, their need for assistance would decrease. This appears to be the case only in terms of routine questions. Mann Library (Madden, 1987b, pp. 96-97) and Texas A & M (Hall, 1986, p. 341) report that as users become more sophisticated, they may actually become more demanding and present library staff with more difficult problems to solve. Madden (1987b, p. 97) and Piele et al. (1986, p. 377) also report that instruction programs, particularly seminars on bibliography management, may generate more, not less, demand for specialized consulting as librarians reveal themselves to
have special expertise in this area.

Faced with heavy user demand for assistance, libraries have found a number of ways to extend their time and skills, including:

- Use of student assistants, pages and volunteers.
- Differentiating service levels for different types of software and labeling software accordingly (Hess, 1988, p. 95; Nollan, 1986).
- Developing a distributed approach to service in which expertise in particular areas on campus or in the community is identified and referrals made accordingly (Seiden, 1988, p. 79; Madden, 1987b, p. 96).
- Requiring that patrons complete an orientation program before being allowed to use library microcomputers. Such an orientation program might be produced on videotape (Polly, 1985, p. 14).

Staff Training

For libraries adding microcomputers for public and student use, staff training has been a major concern. At a time when relatively few library staff had used microcomputers, training programs were often aimed at overcoming initial fears. Dewey (1984) offered twelve useful suggestions for training novice staff members for public access microcomputer installations, stressing the need to keep the training hands on, low key, and fun. He recommended holding regular training sessions and spreading them out over several weeks (pp. 56-57). Rappaport (1985) described an extensive staff training program for public access microcomputing carried out at many branches of the New York Public Library that was likewise designed to make staff comfortable with computers.

After generally familiarizing staff who will be involved in assisting patrons, the additional training needed will depend on the type of software collected and the level of service to be offered. If general microcomputer application programs are to be a staple of the facility, more extensive training will be needed. Fortunately, many training options are available. Ideally, the staff member's own learning style can be accommodated, and staff can choose among working through tutorials, watching a videotape, and attending workshops and short courses available on most campuses or in the community. If many staff members need such training, in-house instruction may be most cost effective. Such training for public access sites will differ little in design from training programs designed to teach staff to use microcomputers for library-related tasks. Baskin and Spencer (1983) offered useful recommendations for designing in-house training programs, covering such topics as rhythm, timing, variety, the use of humor, accommodation of learning styles, and logistics. An extensive four-level in-service training program for media center
staff and teachers was described by Woolls (1986).

Competency in the use of microcomputers among library staff has grown considerably in recent years. Librarians and other staff are likely to use microcomputers as tools to accomplish library-related professional tasks, from writing reports, compiling bibliographies, and keeping track of budgets to searching remote and CD-ROM databases. These computer skills and the general sense of being comfortable with the use of microcomputers, carry over well into public access situations (MacLean, 1988, p. 22; Piele, 1982, p. 21), although, as Lane (1990) points out, "those who support a microcomputer system will always need more training than those who need only to use that system" (p. 94). They will need to be acquainted with a wider variety of software and additional ways of using familiar programs.

Because the use of student assistants to provide help in microcomputer labs is so prevalent in academic libraries, special attention should be given to their training needs. Students will generally be hired, at least in part, on the basis of their computer skills and background so that training will be focused on the particular software used in the library, library policies and procedures, and human relations skills. Checklists of competencies that should be demonstrated within a given period can help organize training efforts. These can be arranged at several levels with promotions contingent on demonstrating higher levels of competency. Students may be asked to specialize in one type of software or to become the resident expert on particular packages as they arrive (Madden, 1987a, p. 26). These staff members can then prepare any necessary documentation and point out potential trouble spots to other assistants.

Time spent cultivating the library's service philosophy may be even more critical than technical training. Hess (1988) offers the following instructions for student assistants, developed and contributed by one of the libraries that completed her survey of academic libraries:

Goal—to make patrons feel good about using micros.
First step—make sure you know what the problem is.
First question—IS THIS BACKED UP?
Tell them why, not just how.
Unless you know otherwise, assume they know nothing.
Refer to the documentation often when helping, even if you know how.
Stand up as they approach and smile.
End most sessions with: "Just let me know if you need any more help" (p. 95).

BIBLIOGRAPHIC AND FULL-TEXT DATABASES ON CD-ROM
In contrast to their somewhat diffident attitude toward providing
assistance for patrons using collections of software on diskettes and the wide variation in service philosophies that resulted, reference librarians showed little hesitation in adopting CD-ROM technology as their own and assuming a full-service reference posture toward it. In Salomon's (1988) survey of 150 academic libraries, she found that, although most respondents thought that assisting CD-ROM users would mean more work, only 8 percent thought that traditional reference questions should have a higher priority (p. 210). The reference department at the University of Pennsylvania was typical in determining that "librarians on desk duty should help CD users just as they would help patrons with printed or microform indexes" (Bryan & Chenoweth, 1989, p. 97). This view of CD-ROM materials as deserving of full reference services is reflected in the decision of most libraries to locate workstations in the reference area within sight of the reference desk (Stewart, 1990, pp. 4-5).

Despite their commitment to full reference service, librarians have found it a challenge to attain this goal. The need to develop new skills and the heavy demand for assistance have caused practical difficulties. The problem posed by insufficient time has been particularly difficult to solve as librarians have discovered that it simply takes more time to teach a patron to use a CD-ROM index and troubleshoot the process than to use a printed one. Carey and Massey-Burzio (1989) point out that in a printed index users look up only one term at a time and have only one type of vocabulary to worry about. In a CD-ROM index, they may be juggling several terms, some descriptors and some free-text, and trying to tie it all together with a search strategy. The patron will need help not only with the search protocols but with the concepts as well. In addition, they will need help with the keyboard and the printer (p. 990).

As a result, libraries have found themselves overwhelmed by the workload at the reference desk (Stewart, 1990, p. 12). Librarians report spending anywhere from one (Nissley et al., 1989, p. 98) to forty minutes (Pope, 1989, p. 94) to assist individual patrons in getting started. Trying to assist users of CD-ROM indexes while coping with ongoing reference traffic may mean service compromises. Youngkin et al. (1990) identify many variables that will affect the amount of assistance a user actually receives, including "staff members' own level of expertise and perception of the patron's need, the needs of other patrons coming to the desk, and the patron's questions, personality, demand for assistance, experience with computers and the SilverPlatter software, subject expertise, knowledge of the MEDLINE database, and purpose of the search" (p. 127).

Coons and Stewart (1988) note the frustration felt by many librarians who observe evidence of poor search strategies left on
screens, presumably due to lack of sufficient assistance: "Although five or ten minutes of individualized instruction could have prevented these errors, we are not always able to provide it, and students do not always ask" (p. 35).

However, users seem to be more satisfied with the results they are getting than are librarians. Glitz and Yokote (1990) report that a formal evaluation at UCLA's Biomedical Library revealed that users were both overwhelmingly satisfied and seriously "underutilizing the system" (p. 271). Allen (1989, 1990b) found similar discrepancies between users' self-reported satisfaction and the quality of their search results in studies carried out at the Undergraduate Library at the University of Illinois at Urbana-Champaign. Ritch (1990) identified at least one of the reasons for the discrepancy between user and librarian satisfaction: "Most systems are easy to use and hard to master. They engage the user so swiftly in simple searches that there is little motivation to seek assistance in adding more advanced features, however invaluable, to existing skills" (p. 33).

In holding themselves accountable for the quality of their patrons' searches, are librarians striving for an inappropriately high level of service? O'Leary (1990) acknowledged that a user's search strategy may be "deplorable by the standards of an experienced online searcher, but if that person goes away happy, who is to say which standard should apply" (p. 31)? Schultz and Salomon (1990) pointed out that most patrons don't use printed sources to full advantage either and that many undergraduate students really do need only "a few good articles" (p. 57).

Counter arguments run along several lines. Those concerned with lifelong learning skills cite the need to ensure that student patrons understand the concepts involved, not just the protocols of a specific system, in order to "be able to take advantage of future developments throughout their careers" (Plutchak, 1990, p. 114). Plutchak (1989) also deplores the inefficiency represented by poor searches in arguing that librarians should assume responsibility for doing something about the "satisfied but inept end user." He urges libraries to take a proactive role in exercising their responsibility for "the overall use of information resources" (p. 48). Reese (1990) pointed out that patrons differ considerably in their needs for high quality searches and that a level of service appropriate to meet the relatively modest needs of undergraduates would be inappropriate for doctoral students who must conduct carefully constructed literature reviews (p. 47).

Rapp et al. (1989) lent historical perspective to the issue by citing Bacon's 1915 article which discussed many of the same issues in terms of the then controversial "end-user" access to the Readers' Guide to Periodical Literature (p. 13). Harter and Jackson (1988) observed
that the question is an "uncomfortable" one for librarians because "it raises deep-seated ethical and professional concerns" (p. 519). They called for more research into what users really need from electronic search systems (p. 525).

A useful example of such research on user needs and search strategy effectiveness was conducted by Liebscher and Marchionini (1988). They studied the behavior and success of elementary school students using a full-text CD-ROM encyclopedia in terms of their use of browsing versus analytical (i.e., using Boolean operators) search methods. The researchers found that, given the objectives of the search task and the particular tool, the browse method was at least as effective as the analytic method.

User surveys indicate that patrons prefer to learn how to use CD-ROM databases by having one-on-one instruction available to them at precisely the time they need it (Allen, 1990a, p. 91; LePoer & Mularski, 1989, p. 43; Steffey & Meyer, 1989, p. 39; Lynn & Bacsanyi, 1989, p. 21). Because librarians are not able to provide this level of service consistently, they have found a number of ways to stretch their time and expertise.

As in the case of microcomputer labs, paraprofessionals and student assistants are used by many academic libraries to orient patrons to CD-ROM databases and to troubleshoot problems as they arise. We would agree with Bonta and Kalin's (1989) contention that the high proportion of questions from users that are mechanical in nature (using printers, starting the system, changing disks, etc.) is sufficient justification for doing so (p. 11).

Another tactic has been to develop alternate methods of giving instruction to students, such as making vendor supplied documentation readily available, pointing out help screens and system-supplied tutorials to patrons, and developing additional brief handouts, posters, and keyboard templates for each database. Some libraries have developed search strategy worksheets that users are encouraged to complete before actually sitting down at a workstation (Eaton et al., 1989, p. 61). The University of Pennsylvania developed onscreen tutorials for each of its CD-ROM databases (Bryan & Chenoweth, 1989, p. 95), and the University of Houston is developing a front-end expert system for its CD-ROM local area network that will help users select databases (and print materials) appropriately (Bailey & Gunning, 1990).

In addition, many libraries have offered special workshops for new users, and most report incorporating demonstrations and use of CD-ROM indexes into their ongoing bibliographic instruction programs. Formal instruction is often seen as a more desirable setting for instructing patrons in search strategy concepts (as opposed to
search mechanics).

Staff Training

The second reality that has affected the ability of libraries to meet their goal of providing CD-ROM users with a high level of service has been the initial lack of skills on the part of the service providers—i.e., the librarians themselves. Although libraries have found it challenging to provide the needed initial and ongoing training, the literature suggests that they have generally felt more successful in this area than in meeting the challenge of maintaining and upgrading skills over time.

It has been necessary to design training programs to meet a variety of needs. Librarians already involved in offering online search services have found it easiest to make the adjustment to CD-ROM search software, but even they have had to learn the new search systems. For other librarians, CD-ROM workstations may have been the first microcomputers (as opposed to terminals) that they have used. Thus keyboard and printer mechanics had to be learned in addition to the concepts and protocols of computerized literature searching. Also, many nonprofessional staff have been involved in assisting the public, from student employees to circulation staff, and these staff members have needed some level of training. Finally, because search software is often updated and new products are purchased, the training in this area has had to be developed into an ongoing process.

Many librarians have found it stressful to learn a variety of search systems and databases in a short period of time (Carrey & Massey-Burzio, 1989). To some degree, they may have been attempting to achieve an unnecessarily high level of expertise. At Brandeis, for example, librarians found, to their surprise, that “not only are most patrons satisfied with the simplest of searches, but that it is quite acceptable for us to try a variety of approaches and to check the manual when necessary as we assist our patrons” (Carey & Massey-Burzio, 1989, p. 989).

Skills needed by those who assist patrons can be divided into two categories:

1. Basic Skills: use of workstation keyboards; entering and exiting systems; loading and changing disks; turning equipment off and on; warm booting a system; use of documentation, including thesauri, online help, and tutorials; loading paper and fixing paper jams; changing ribbons and ink cartridges; procedures for referring patrons who need help formulating searches.

2. Searching Skills: knowing the types of databases available and the types of questions for which each would be used; entering search terms; using controlled vocabulary and free text options,
including proximity operators, if available; combining sets; truncation; limiting; database fields and field-specific searching; displaying, printing, and downloading; error message interpretation; use of DOS.

Two levels of training may be established with some staff learning only basic level skills and others all skills. For example, at Hahneman University, student assistants are trained only on hardware skills, while reference and circulation staff are trained to use both hardware and software. This library also developed an explicit seven-step protocol for assisting new users which staff are trained to follow (Silver, 1988, p. 65).

In addition to training in CD-ROM skills, it may be desirable to give staff additional training in the use of microcomputers. For example, Glitz and Yokote (1990) report that the need for additional microcomputer literacy on the part of the reference staff at the UCLA Biomedical Library became apparent with the advent of its CD-ROM service. Reference staff attended workshops on the use of microcomputers that were available on that campus in order to become familiar with the use of database management and word processing programs (p. 273).

Staff responsible for maintaining a LAN configuration will need special training in hardware and systems. At Howard County Library in Maryland, when its Info-Lan was installed, three days of intensive training was supplied by a consultant working with the library on the project (Hill & Demmitt, 1990, p. 241).

Libraries have employed a variety of training tactics, including:

- Setting up a workstation in a staff area before introducing the service and each new database to the public in order to allow time for self-instruction and practice.
- Devising practice questions and self-paced exercises for each database for staff to practice on. These may be combined with small group sessions (Maxymuk, 1990, pp. 24-25).
- Assigning each database to an individual staff member who becomes the local expert on it and trains other staff (Tucker et al., 1988, p. 39).
- Developing special instruction sheets for staff with answers to most frequently asked questions.
- Making screen dumps of online documentation to supplement other printed documentation.
- Establishing two levels of expertise; all staff, including those staffing the reference desk only a few hours each week, can be
expected to be able to handle the basics, with a few designated to become very knowledgeable about particular systems (Warren, 1989, p. 4).

- Developing checklists of needed skills and giving them to staff to complete; training can then be given to staff members individually depending on their needs (Carey & Massey-Burzio, 1989, p. 990).

Libraries have found that training cannot be a one-time thing. Not only are new products received and old products updated, but skill refreshers are needed, especially for staff who work only a few hours a week on the reference desk, or for databases that are less frequently used. And, of course, new staff must be oriented and trained. This is a particular problem among staff with high rates of turnover such as students and interns. Initial training programs might be designed with these ongoing training needs in mind. For example, skills checklists, self-paced exercises, and manuals, once developed, can be used to train new staff.

**Numeric Data Files**

Until a few years ago, libraries wishing to collect and provide access to numeric information in machine-readable form had to deal with magnetic tapes and the large computers necessary to mount them. The complications involved were too daunting for all but a few academic libraries to overcome. Libraries that did so included the University of Florida (Jones & Wittkopf, 1980; Jones, 1982; Pope, 1984), the Social Science Library at Yale University (Dionne, 1984), the University of British Columbia (Ruus, 1982a), and Lawrence University in Appleton, Wisconsin (Isaacson, 1982).

As numeric data began to be made available on diskettes and CD-ROM, the opportunity to collect and provide access to information in machine-readable form became available to any library with microcomputer and CD-ROM workstations. With much statistical data becoming available only in machine-readable formats, Jones and Seale (1988) predict that reference librarians will have little choice but to deal with statistical data in this format (p. 7).

Of course, the awkwardness of the format has not been the only difficulty involved in providing access to numeric data on magnetic tape or CD-ROM. Dealing with numeric rather than bibliographic or full-text data raises special service issues and training needs. What can be learned in these areas from libraries that have previously dealt with numeric data on magnetic tape?

In defining the level of service to be provided for users of magnetic tapes in their collections, libraries have typically referred to guidelines already in place for print materials. The University of Florida library,
for example, attempts to think only in terms of the basic library goal of connecting the user to the information he or she needs, "whether from a printed source located through an index or from a data set" (Jones, 1982, p. 390). Service, therefore, has involved providing access by helping the patron to identify and locate the data needed, usually by examining code books and other documentation, and loading or arranging to have the tape loaded. Librarians have also provided printed guides and other written instructions and have integrated the use of machine-readable numeric data sources into bibliographic instruction programs (Jones, 1982, p. 394). Although reference librarians at the University of Florida have occasionally coded requests to have the data extracted, this process has usually been handled by library systems staff as has programming needed to extract data (Pope, 1984, p. 268).

Data analysis has been specifically excluded from the services offered by most libraries. Although it is acknowledged that patrons need access to statistical consultation, librarians are not seen as the appropriate source of this expertise (Jones, 1982, p. 390; Dionne, 1984, p. 243; Isaacson, 1982, p. 168; Ruus, 1982a, p. 403). Jones and Seale (1988) describe the system at the University of Florida where the reference librarian "acts as a bridge, interpreter, and coordinator with either a systems, consulting, or research unit on campus or a group within the library" (p. 8). Pope (1984) describes in some detail the coordination and the precise steps that may be involved in such a team approach involving reference librarians (p. 268).

Bernard and Jones (1984) attempt to differentiate clearly the librarian's role from that of the social scientist. They contend that librarians should not get involved in evaluating the quality of machine-readable data files (MRDFs). Nor should they "act as even the most low-level consultants on the use of SPSS and other similar packages" (p. 96). They should, on the other hand, teach users (who, one assumes, are primarily graduate students in the social sciences) "the documentation skills (and not the statistical skills) that people need in order to use MRDFs...scholars need instruction both in the content of MRDFs and on the methods for interrogating MRDFs" (p. 97).

Mignon (1980), writing about the use of remote statistical databases, also contends that librarians should not get involved in providing statistical analysis: "This calls for the judgment not of a literature searcher but of an experienced statistician" (p. 183). He compares the judgment required for knowing how far to go in manipulating statistical data in answering reference queries to the ethical problem faced by librarians in dealing with legal and medical questions (p. 183). He does, however, give examples of several types
of data retrieval and manipulation not involving the use of statistics that could be part of the reference librarian's repertoire (p. 184).

Opinions on the librarian's role in establishing the validity of particular data are divided. Dionne (1984) appears to disagree with Bernard and Jones (as cited earlier) in asserting that librarians must assume responsibility for being aware of the validity of the data they are providing to patrons, and that they should inform patrons of any problems (pp. 244-45).

Libraries collecting numeric data files on diskettes and CD-ROMs will face many of the same service issues and may adopt similar policies and strategies as the pioneers who have dealt with magnetic tapes. For example, when the Davis Library at the University of North Carolina established its Machine Readable Data Files Center, it adopted a service policy providing basic access but drew the line at consulting in technical or statistical areas (Jones & Seale, 1988, p. 141).

It appears that the skills and time required to assist users with numeric data files on CD-ROM will depend in large part on the design of particular products. Some arrive as stand-alone products with sophisticated retrieval and analysis capabilities built in. Offering both a menu driven and a command searching mode, products such as Disclosure do not require extraordinary effort to train staff and yet allow the user a high level of control over the output (Halperin & Pagell, 1986).

Other data files, such as the U. S. Census disks, lack what Paisley (1990) terms "post-retrieval features" (p. ix) but do come equipped with simple menu-driven retrieval capabilities that allow the user to view and print data. However, because the census disks are formatted to allow them to be accessed by database management programs such as dBASE, anyone with access to a microcomputer, hard disk, an appropriate program, and the necessary skills will be able to manipulate and repackage the data (Munroe, 1989, p. 508).

If libraries choose to make such additional hardware and software available, they will need to determine the level of service to be offered to users. Will the ability of users to exploit these capabilities be dependent totally on their own skills or will librarians assist them, perhaps even serving as intermediaries? If Holloway and Jackson (1989) are correct in predicting that more and more data files on CD-ROM will be accessible with standard microcomputer application software (p. 59), libraries will have many opportunities to offer such enhanced services. Kuhlman and Lee (1986) urged all types of libraries—public and academic as well as special—to take full advantage of these new capabilities by providing patrons with "timely, definite answers" rather than simply the sources for answers (p. 760).
However, Cornick (1989) warned that the amount of time that will be required to provide all but the most basic services with most numeric data files should not be underestimated:

if data bases on compact discs create problems for the staff in providing assistance, machine-readable data files can cause nightmares. Usually the files are complex and may arrive in “compressed” or “squeezed” formats with little or no understandable documentation to help unravel the mysteries. Hours of staff time will be required to understand each data file, write documentation, and teach staff and patrons about them. (p. 148)

She went on to report that staff at the University of North Carolina’s Machine Readable Data File Center in Davis Library typically spend one hour working with each patron accessing a large data file (not counting time spent examining the file in preparation for the patron’s appointment) (p. 149). Jones and Seale (1988) also stressed the difficulties encountered by reference librarians working with large data sets and explained why this is a difficult and time-consuming process (p. 8).

Two authors have provided particularly useful discussions related to possible service levels. Ruus (1980) applied Rothstein’s three service levels (minimum, middling, maximum) to the range of services that a data archive might offer; Gerken (1988), updating the discussion by including diskettes and CD-ROMs, also defined three levels of service. The following are examples of services that might be offered at three levels:

**Basic**
- maintain reference tools and help patrons identify and locate appropriate data files;
- provide stand-alone CD-ROM numeric databases on either a self-service or intermediary basis;
- integrate information about the availability and use of numeric databases into instruction programs;
- make microcomputer workstations and programs (e.g., database managers and spreadsheets) available for users who wish to repackage data;
- provide referral to expert services available outside the library;
- establish cooperative arrangements with expert-specialists to facilitate referral of patrons;
- consult on citation formats for numeric data in machine-readable formats.

**Intermediate**
- act as intermediary between user and database by extracting data;
- provide CD-ROM databases that are accessed by standard microcomputer application programs, such as dBASE and
Lotus 1-2-3;
- train and assist users in the use of database management and spreadsheet programs used to retrieve and repackage data;
- assist in transferring files to users' own diskettes;
- prepare documentation to supplement inadequate vendor documentation;
- instruct users in the use of code books and other documentation;
- evaluate validity of data and explain any problems to patrons.

Maximum
- repackage data in a form useful to the user;
- provide programming necessary to retrieve data;
- interpret statistical products;
- provide data analysis;
- consult on statistical and research methodology.

Just as with software on diskettes and public-access microcomputer facilities, factors affecting the level of service that a particular library will wish, or be able, to offer include the type of library and its mission, the size of the library, the availability of expert consultants outside the library, and the type of patron (student, community, faculty, researcher, administration). Strategies used by librarians to extend their expertise and time in assisting users with programs on diskettes and bibliographic and full-text CD-ROM databases can be used with numeric data files as well. For example, in academic libraries, student consultants can be used to assist patrons wanting to use application software to retrieve and repackage data, and the distributed service model can be employed to take advantage of expertise elsewhere in the institution or community (Gerken, 1988, p. 64).

Training
One of the problems that reference librarians are likely to face as they begin working with numeric databases is that, as Kuhlman and Lee (1986) point out, their literary skills are generally more highly developed than their numerical skills (p. 760). Thus training is probably even more critical in this area than with bibliographic and full-text CD-ROM products, as fewer librarians will be able to train themselves.

However, training needs will depend in large part on the particular data files collected. For stand-alone CD-ROM products, librarians will need to become familiar with the content and retrieval software, including any post-retrieval features. Strategies used to train staff in the use of bibliographic CD-ROMs would be appropriate for these products as well.

When working with other types of data files, the ability to use
standard microcomputer database management and spreadsheet programs to access and repackage data will be needed. Additional microcomputer skills that will be helpful when assisting users with data files are the ability to work with ASCII files and to convert files in order to transfer them from one application program to another. Training in these areas is available on most college campuses and in most communities. In large libraries with systems staff, special workshops may be developed for reference librarians.

Dionne (1984) believes that librarians' ability to work with social science data will be enhanced if they gain some familiarity with statistical techniques and quantitative research methodology, even if they do not offer consultation in these areas (p. 243). Librarians planning to work intensively with numeric data files may benefit from training opportunities that data archivists have utilized. These include training programs offered by the census bureau, by the International Association for Social Science Information Service and Technology (IASSIST), by CAUSE, and by the Inter-University Consortium for Political and Social Research (ICPSR). In addition, Ruus (1982b) suggests that librarians audit courses in research methodology with a quantitative bent, such as almost any university offers (p. 461).

CONCLUSION

Although software on diskettes, bibliographical and full-text databases on CD-ROMs, and numerical data files have been treated separately here, there is clearly a great deal of overlap among the three subtopics in terms of service issues and training. For example, librarians who have been heavily involved with the first two software categories will be relatively well-prepared to face the challenge of adding numerical data files to their repertoire. The fact that they are not microcomputer novices may make it possible to establish higher service levels initially than would otherwise be the case.

Although the level of assistance being offered by libraries to patrons using microcomputer software will continue to vary widely, the trend may be for libraries to offer higher levels of assistance. Moran (1989), for example, predicts that patrons will demand even more new services as libraries make more information technology available to them: "The possibilities in this area are limitless and will be constrained only by the amount of time librarians have available to be divided among competing demands." She offers as an example of such new services, helping patrons to download information in machine-readable form and construct personal databases (p. 36).

The view that technology will lead librarians to reevaluate their
service role is widely shared. Miller and Gratch (1989) identify questions they believe must be asked for this and succeeding generations of technology: "Do we push ahead or react conservatively? Do we stress end-use or mediation? Do we teach or try to remain uninvolved? Are we instructors with an important proactive role, acting as consultants to our clientele, or are we CD-ROM disc jockeys slinging whatever technology is current" (p. 399)? This emphasis on the role of librarians as consultants, a characteristic of higher service levels, is a common theme of those writing about the future of libraries (Surprenant & Perry-Holmes, 1985, p. 236; Harter & Jackson, 1988, p. 521; Hallman, 1990, p. 207).

What are the obstacles that must be overcome if higher service levels are to be more widely offered? First, making difficult choices between comfortable old services and stressful new ones will require courage on the part of librarians. Rothstein (1961), who was advocating a more consultative role for librarians thirty years ago at a time when technology had little impact on the reference desk, identified fear as one reason that librarians were loathe to move beyond a minimum level of reference service: "Fear, first of all, that the library can never hope to have the manpower to render more than severely limited assistance. Fear, again, that the patrons will take undue advantage and make exorbitant demands. And finally, 'errorophobia,' my new word for that old malady: the librarian's fear of making a mistake" (p. 14).

Even Rothstein (1961), however, acknowledged the very real additional obstacles to maximum service levels posed by the need for highly trained staff and the large amounts of staff time involved in providing such service to large numbers of patrons (pp. 16-17). Training programs such as those devised by reference librarians to bring themselves and other staff up to speed on CD-ROM bibliographical databases are just as feasible in other areas of software support, and external sources of training are readily available. But the time problem will find no easy solutions. Although increased library effectiveness can help administrators make the case for more staff, creativity and flexibility in the way staff is allocated will continue to be necessary, as will fresh ways of looking at all available resources. Strategies that have been helpful in the past, and that can be looked at again, include the use of paraprofessional and student staff in appropriate roles (including technical consulting), staff specialization, and distributed service models in which libraries develop effective referral networks.

References


The Laserdisk Professional, 3(1), 24-27.


Plutchak, T. S. (1990). New approaches to access: CD-ROM at the St. Louis University Medical Center Library. In L. Stewart, K. S. Chiang, & B. Coons (Eds.), Public access CD-ROMs in libraries: Case studies (pp. 109-121). Westport, CT: Meckler.


Software for Patron Use in Academic Libraries—The Texas A&M Experience

HALBERT W. HALL and KATHY M. JACKSON

ABSTRACT
This case study describes the policies and procedures for the selection, maintenance, and servicing of microcomputer software provided to users of the Learning Resources Department (LRD) of the Sterling C. Evans Library at Texas A&M University. Founded in 1979, the LRD provides microcomputers and software for student use, as well as some instructional classes. Collection development policies, selection criteria, upgrades, withdrawals, security, preservation, maintenance, the role of related computing centers, staff training, and service uses are presented.

INTRODUCTION
Providing public access to microcomputer software is not as simple as providing access to printed material. The circulation of software provides many challenges to the academic librarian. The authors will discuss how software is selected, serviced, and maintained in the Learning Resources Department of the Sterling C. Evans Library. When possible, LRD policies and practices will be compared with those of other microcomputer facilities in other academic libraries. Data on microcomputer labs were obtained from articles compiled by Richard Nollan (1986), and authored by Anne Hess (1987), as well as from queries sent to particular academic libraries.
BACKGROUND

The LRD began in 1979 with special funding provided by the Texas A&M University Administration. Initially, several Radio Shack TRS-80s and Apple IIe's were purchased for the LRD. Through the years, the university has continued to provide extra support, especially for hardware purchase and maintenance. The primary funding for software is included in the library's acquisitions budget. Figure 1 shows the growth of the LRD in number of computers. The decline in the number of Apples, TRS-80s, and miscellaneous machines contrasts sharply with the steady increase in the number of Macintosh and IBM-compatible machines. The predominance of the Macs and IBM machines can be seen more clearly in Figure 2, which breaks down the computer count by model and year. These data are presented because they have a direct bearing upon the software collected. They also illustrate the rapidly changing need for support for various new models of computer.

![Graph showing computer growth in the LRD (1982-1990).](image)

**Figure 1. Computer growth in the LRD (1982-1990).**

<table>
<thead>
<tr>
<th>Microcomputer</th>
<th>Laboratory A</th>
<th>Laboratory B</th>
<th>Laboratory C</th>
<th>Laboratory D</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM/compatible</td>
<td>72.0%</td>
<td>40%</td>
<td>90%</td>
<td>40%</td>
</tr>
<tr>
<td>Macintosh</td>
<td>28.0%</td>
<td>60%</td>
<td>10%</td>
<td>60%</td>
</tr>
</tbody>
</table>

*Table 1. Types of software provided by the Learning Resources Department and three other library labs.*
Most labs, it appears, support Macintosh and IBM-compatible machines. Table 1 compares the types of software provided by the LRD (Library A) and three other library labs.

<table>
<thead>
<tr>
<th>Year</th>
<th>New Computer</th>
<th>Number</th>
<th>Surplused</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>Apple II+</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balcones</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TRS-80 Model 3</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>Apple IIe</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plato</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TRS-80 Model 4</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>Compaq</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IBM PC</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kaypro II</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Texas Instruments PC</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TRS-80 Model 4</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>IBM PC</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tandy 1000</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>Apple IIe</td>
<td>2</td>
<td>Apple II+ **</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Zenith PC</td>
<td>11</td>
<td>TRS-80 Model III</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>IBM 2-Pen Plotter</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IBM 6-Pen Plotter</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>IBM PC (CSC)</td>
<td>25</td>
<td>Apple II+ **</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>IBM XT (CSC)</td>
<td>15</td>
<td>Balcones</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>IBM PS/2 Model 30</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IBM PS/2 Model 50</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Macintosh SE</td>
<td>9</td>
<td>Plato</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Macintosh + (CSC)</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VT 200 Terminals (CSC)</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>Macintosh SE</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Macintosh SE/20</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>IBM PC</td>
<td>1</td>
<td>Texas Instruments PC</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Macintosh SE</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zenith Supersport</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apple Laser Writer /NT</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>Computer Access 386</td>
<td>20</td>
<td>Apple IIe</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Macintosh SE/20</td>
<td>1</td>
<td>Tandy 1000</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Macintosh SE/30</td>
<td>4</td>
<td>Texas Instrument PC</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Macintosh + (CSC)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apple Laser Writer /NT</td>
<td>1</td>
<td>TRS-80 Model IV</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total**
- Computers: 144
- Terminals: 35

Figure 2. Computer count by year.
These findings agree with those of the Hess study in which she found that the seven labs studied devoted 82 percent of their software collections to the support of IBM-compatible, Apple, and Macintosh machines (Hess, 1987, p. 8). The size of the collections studied by Hess varied greatly, from the smallest lab with forty-six software titles, to the largest with 663. That same variability in collection size exists today. The LRD has 345 different software titles. Lab B has less than 50; Lab C has over 100, and Lab D has over 500. Lab A was included in the Hess study but Labs B through D were not included.

**Collection Development Policy**

The establishment of a collection development policy for a library microcomputer lab should be based on sound principles and guided by a clear understanding of the mission of the microcomputer lab and the software collection. If the mission of the lab is strictly classroom support, one set of selection criteria will apply. If the mission is classroom support plus promoting general computer literacy or evaluating software, the selection criteria will be significantly different. In either case, the needs of the lab user should be the key guiding factor in collection development and selection. The microcomputer world evolves, changes, and accelerates at such a rapid pace that written policies frequently lag behind reality and need. This is an area in which general guidelines are far more valuable than lengthy, exact, and often restrictive policy statements. The perception of the needs of the lab user, and the mission which derives from those needs, is the most important single element needed for the successful development of a microcomputer software collection.

The mission statement and collection development policy for microcomputer software of the LRD is a simple one: meet the teaching needs of the faculty and the computer use needs of the student body. The LRD does have a much longer document in place, but that is its essence. The LRD serves a significant role on campus as an evaluation site for promising new software. Single copies of promising software are acquired and made available for use and evaluation as funds allow. The potential applicability, cost, and other aspects of such software are reviewed before acquisition is recommended. Whenever possible, "trial versions," "evaluation copies," or donated copies are solicited in lieu of purchasing.

While microcomputer lab software selection criteria may differ, most seem to take into account the following factors: compatibility with hardware, faculty requests, need to support courses, price, and favorable reviews.
Selection

Review Sources. The LRD relies on microcomputer magazines for reviews and commentary on software. Some library sources do exist, but they are, in general, much slower in acquiring and evaluating products than is the microcomputer press. Our primary evaluation tools are *InfoWorld*, *PC Week*, *PC Magazine*, *MacWeek*, *MacUser*, and *Byte*. For public domain software, *Shareware Magazine* is a good source of information, along with the miscellaneous tidbits available in general sources. Recently, for example, very good shareware tips have appeared in the *Austin [Texas] American Statesman*'s business section each Monday. Many other newspapers and magazines offer similar columns. The *Chronicle of Higher Education* notes new academic courseware in a "New Computer Software" column in each issue, which features brief descriptions, but no evaluative comments. Other sources mentioned by lab directors include the *Computer Library CD-ROM* and *EDUCOM*.

Types of Software Collected

While the selection criteria and review sources may vary, there seems to be a trend among microcomputer labs to provide software which falls into certain categories. The types of software shown in Table 2 seem to predominate. The percentages given represent the portion of each lab's collection devoted to that particular type of software.

<table>
<thead>
<tr>
<th>Software type</th>
<th>Laboratory A</th>
<th>Laboratory B</th>
<th>Laboratory C</th>
<th>Laboratory D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>3%</td>
<td>3%</td>
<td>10%</td>
<td>1%</td>
</tr>
<tr>
<td>Programming language</td>
<td>11%</td>
<td>3%</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>Word processing</td>
<td>12%</td>
<td>11%</td>
<td>80%</td>
<td>7%</td>
</tr>
<tr>
<td>Database management</td>
<td>10%</td>
<td>5%</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>4%</td>
<td>5%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Utilities (inc. communications)</td>
<td>15%</td>
<td>26%</td>
<td>30%</td>
<td>24%</td>
</tr>
<tr>
<td>Graphics</td>
<td>13%</td>
<td>9%</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Educational, college-level</td>
<td>9%</td>
<td>31%</td>
<td>0%</td>
<td>16%</td>
</tr>
<tr>
<td>Other</td>
<td>23%</td>
<td>7%</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Version Selection and Replacement

The LRD offers laser printer support for the most popular programs used around the campus. For all programs with laser printer support, the most current version is always maintained on the laser
printer station. In addition to offering the most current printer support package for printing, the LRD makes one copy of each supported program available for general use to allow the user to make editorial corrections and revisions in the lab. For example, *WordStar* 6.0 is offered on the laser printer and on one other station, but the workhorse version made available for general word processing is still *WordStar* version 3.3. A similar pattern exists for other programs whose popularity is eroding, or which have a small user population.

*Printer Driver Update and Support*

**Internal Needs.** The LRD currently offers both quality printing on a laser printer and draft printing on dot matrix printers. Whenever a new printer is acquired for the unit, all major software packages are evaluated for need, and printer drivers for all vendors are acquired for the unit. The recent purchase of twenty Hewlett-Packard Deskjet 500 printers had us scrambling for printer drivers for the packages in heaviest use. As you might expect, responses ranged from “We’ll send a free driver to you today!” to “Don’t call us, we’ll call you—collect!” In general, however, vendors are responsive and helpful in dealing with this particular problem.

*Patron Requests and Needs*

Normally, the LRD does not acquire printer drivers at patron request except for its own equipment. The one exception is the university-wide site licensed software for which the LRD is a major distribution point. In those cases, the LRD will acquire the latest printer drivers for distribution. For direct purchase titles, the “printer disk” set is not made available to general users. The LRD installs all appropriate printers for internal use, and has taken the policy stand that printer drivers for printers not owned by the LRD should not be provided to users. In the case of the one applicable “site license” package, the complete printer driver set was available for distribution to any qualified user.

*Version Upgrade: Generation Skipping*

Software upgrades come at an alarming (and expensive) rate. For primary software, such as *WordPerfect*, *Microsoft Word* and a few others, at least one copy of the new software version is acquired for printer support. That copy is evaluated for degree of change, importance of changes, needs related to the new features, patron demand, and cost. If the evaluation indicates upgrade is important, then all copies are upgraded. If changes are minimal, cosmetic, or
not judged critical for operations, upgrading is deferred until another
version comes out. As a result, version life of many software products
is extended although the LRD rarely maintains a version more than
three generations old.

In some cases, however, upgrades are deferred indefinitely. For
example, we continue to run *Lotus* 1-2-3 version 2.01 even though
two subsequent upgrades are available. The pricing policy has made
upgrading that product too expensive for the LRD's budget, and
competing products with equal or better features are available for
significantly less cost. In addition, version 2.01 remains an adequate
tool for teaching basic spreadsheet principles, and the basic techniques
taught are applicable to both later versions of the program.

In other cases, upgrades are deferred because the product is not
satisfactory—e.g., DOS 4 and *DBase* IV both suffer from many defects
in their programming. As a result, DOS 4 in fact will be a package
we will defer purchasing until release of DOS 5.0.

**Public Domain, Shareware, and Commercial Programs**

While the LRD collection includes some quality public domain
or shareware programs, the unit was budgeted adequately to allow
consideration of commercial programs, and the faculty of the
university was strongly in favor of provision of the software which
would most effectively meet both teaching needs and promote the
marketability of graduates. As a result, the LRD started with and
has retained an orientation toward commercial software.

It is frequently noted that shareware or public domain software
is a less expensive alternative to commercial software. In many cases
that may be true. The best shareware, however, has significant costs
associated with fully supported use in a microcomputer center. It
also bears repeating that shareware products, if adopted in the
computer center and used actively, require payment of the shareware
fee.

When making selection decisions where shareware cost is a major
consideration, it is always wise to contact your local or regional sales
representative for the commercial products being considered.
Frequently, special educational pricing and the availability of
multicopy lab packs actually make the commercial product cheaper
on a unit cost basis. This is particularly true if institutional site
licenses are involved. At Texas A&M, the best software to meet the
goals of the LRD and the university is sought at the best unit price;
most of the time, commercial software offers a better value than does
shareware.

**Public Domain Software Libraries**

The LRD does provide a selected collection of public domain
and shareware programs. This collection is selected and maintained by a local microcomputer club and consists of approximately 1,000 diskettes. Beyond that involvement, the LRD does not support or distribute public domain and shareware disks. The Computer Services Center at Texas A&M University does maintain a subscription to a CD-ROM public domain library with extensive program files available to the campus user.

**Upgrading and Withdrawals**

**Disposition of Upgraded Software.** In virtually every case in the LRD, an upgrade required the removal and destruction of the old version of the program. Upon completion of the upgrade to a new version, the LRD erases all old disks and discards the manuals. These practices ensure that the programs and documentation are not recovered for use at some external unauthorized location. The diskettes, if not worn beyond a point of safe use, are recycled into the lab's operational stock.

**Withdrawals.** Withdrawals of computer software are especially problematical. The disposition of the software is sometimes (but not always) covered in the licenses and warranties under which the product was purchased. In a few cases, secondary distribution has been restricted or forbidden; in others, a substantial fee, along with the name of the third party, must be submitted to the software company; in other cases, no obvious restrictions are noted.

In any case, the question of withdrawal and subsequent disposition of a software package must be answered on a case-by-case basis, referring to all documentation received with the software and adhering to all legal restrictions established by the original manufacturer.

**Reasons to Withdraw Software.** Reasons for withdrawal of software are varied. A few examples will suffice to show the range of reasons for withdrawing titles.

One such reason is that the company folded and the software is now 'orphanware.' It is possible to maintain a copy of a product for years as orphanware and operate it quite successfully. Ultimately, however, that software will fail, and the 'back-up' copy will also fail. At that point the only option remaining is to discard the program.

Another reason for withdrawal is that the product has been declared dead by the manufacturer. In practical terms, the result is the same as with the orphanware noted earlier.

A third reason for withdrawing software is that the hardware on which the software runs is no longer in use or in demand. The LRD owns or has owned multiple copies of programs which run
on the TRS-80 Model III and Model IV. Both the computers and the software were operational and functional. Even though the computers are still good and the software still effective, the environment at Texas A&M University is strictly IBM and Macintosh and students perceive their marketability as sought-after employee candidates as being in part dependent upon familiarity with IBM or Macintosh computers and programs. Thus the older Tandy machines and the software for them were virtually unused.

Newer and better products superseding the product is another reason for withdrawal. Remember Visicalc? It still would be a good entry level spreadsheet, but it no longer exists in any viable form, and, if it did, even the entry level users demand access to the popular spreadsheets: Lotus, Excel, or Quattro. MacWrite was followed by MacWrite II, Personal Bibliographic Software by Procite, and so on. Each major change requires a selection decision: Upgrade, or not? Again, users' needs should be the major factor in such a decision.

Disposition of Withdrawn Software

In the Evans Library, most withdrawn software is destroyed when it is removed. Several points dictated the choice to destroy rather than surplus or sell:

1. The LRD keeps software as long as there is any viable reason to expect use. As a result, the software is quite old, often as much as five or six years, before the withdrawal decision point is reached. We judge that it is actually a service to destroy software that old rather than mislead some user into believing they are acquiring "current" software.

2. Warranty and license restrictions often dictate the disposition of the software. Some conditions of purchase dictate the terms of use in no uncertain terms. "You may install this copy on one and only one computer. Any other installation requires purchase of a new copy." Don't buy that new computer—you cannot legally use your software. Some warranties and contracts specify the conditions under which software may be sold or transferred and virtually exclude these options from consideration. Fortunately, some manufacturers are adapting to the real world and are writing logical, fair, and readable conditions of purchase.

3. The software has failed and all copies are totally inoperative. In this case the diskettes are erased and recycled but only if they are reliable.

Maintenance

Patron Abuse

Patron abuse takes several forms. Most is based on a lack of
knowledge of computers and software and takes the form of inadvertent formatting, erasure of files, or mishandling of the diskette.

The most common forms of abuse by patrons are “disk cram” (Shove it in even if the door is closed!), “lubricated windows” (Whaddaya mean, don't hold it by the neat little thumb slots on the bottom!), “spillage” (Sir, my disk seems to be wet with Coke—will it still work OK?), and “360Kitis” (You mean you don't type “format” to find out whether it is a 360K disk?). On rare occasions, more malicious activities occur, including theft, willful destruction, etc.

Disk Life

The LRD still distributes software on diskette for IBM computers. Disk life varies and has two components. Operational life refers to the length of time a diskette and program remain operational before attention is needed. Physical life is the length of time a diskette may be reused.

In the LRD, operational life of diskettes ranges from eight to twelve months for general little used programs to seven to twelve days for the most heavily used programs such as WordStar and WordPerfect.

Physical life of diskettes is harder to track effectively. The LRD recommends that patrons replace their data disks, if frequently used, each semester. As a rule of thumb, the question of How long should I trust a diskette? is answered with the opinion that anything past six months for frequently used diskettes is dangerous. If pressed, an opinion that “frequent use” may be defined as two to three times per week is offered. These opinions are related as much to carrying conditions in backpacks and proximity to beverages as to anything else.

Copy Protection

If the program is copy protected, the LRD will not buy it if any other alternative is available. It has been the authors' experience that this increases theft, makes maintenance of operational copies difficult or impossible, and places the student user who may be dependent on the package for a grade at too much risk.

Vendors, in general, understand the operational situation in a teaching lab and are willing to make adjustments to ensure the protection of student users.

Viruses

The LRD scans all hard disks for viruses regularly, removes infections, and warns patrons of viral problems. The Macintosh Appletalk environment allows the automatic checking of all diskettes for viruses and the rejection of all infected disks. That system has
been highly effective. We continue to see many examples of infected disks, but only because the student users ask how to clean an infected disk.

The IBM environment is not so easily managed. Although products are available, cost and user education have made it impossible to achieve the level of success found in the Macintosh environment. Products such as Scan, VShield, and a number of others make virus protection a possibility.

Other labs use similar methods of protecting publicly circulating software from tampering or duplication. More labs seem to be loading software on file servers and providing access over a network. Most still post copyright notices on disk drives or even at the beginning of programs.

Labs have assumed responsibility for providing virus protection software, such as Virex—the disinfectant program for Macintosh viruses—on hard disks. The labs also provide virus scan programs on IBM hard disks.

**Intellectual Access**

*Full Cataloging*

The question of "full cataloging" in the conventional sense is still open for some machine-readable file types. In particular, for microcomputer software where version changes are rapid, where upgrade of the version is the rule, and where old versions are not retained, creation of a new record may not be the most appropriate answer. That caveat notwithstanding, a record in the library information system is information which should be available to users.

At Texas A&M, the lack of adequate cataloging staff, the high turnover of versions of software, and priorities for cataloging have limited the cataloging of microcomputer software. Cataloging is done as time and staff allow.

Only lab B, which held fewer than fifty titles, cataloged software using AACR2. Like the LRD, the others relied upon listings by title, application, and/or computer type.

*Internal Listing*

Whether or not the microcomputer software is listed (either fully cataloged or not) in the library catalog, internal listings for in-lab use are often very helpful to computer users. The LRD has historically provided list access by title, type of computer, and type of program. While a search strategy may be formulated to obtain this same level of information from many online access systems, the list used in lab is more efficient and faster to use. It also allows more flexibility than does the online system, bound as it is by cataloging rules,
administrative rules, and sometimes by capabilities. The microcomputer lists at Texas A&M are the first line of use in the lab and are likely to remain so even with full records in the catalog for one significant reason. Only two access terminals are available in the LRD, and only one is for public use. When a significant portion of the microcomputer collection is cataloged, the availability of terminals may increase, of course. Table 3 presents an example of one of the software lists available to LRD users.

**Physical Access**

*Reservations*

The LRD does not reserve software for anyone but faculty who reserve computers and software for actual class presentations in the LRD. Beyond that, software use is on a first come, first served basis.

*Length of Loan*

Check-out of software is not limited in-house. A user normally has access to a computer and software only for a three-hour reservation period. However, a user could (and sometimes does) stay as much as ten hours at a stretch.

*Internal Circulation Only Versus External Circulation*

The LRD policy, developed after reference to many articles and careful reading of many "licenses and warranties," limits circulation to in-lab use. Again, the only exception considered is a faculty member who has special needs which the LRD cannot meet. In our view, the external circulation of software is not in the best interest of either the LRD or the student users of the facility. The LRD has barely adequate software to meet internal needs now; circulation on a two or three day loan would, we believe, seriously reduce the potential time-in-use for the package. It is the authors' opinion that a single user with the software package checked out for three days would use it only a small percentage of the time it was checked out.

The issue of manufacturer's rights is also not clearly defined. While the LRD does not police the area for copying, every reasonable (and sometimes unreasonable) effort is made to limit illegal copying and use of software. In the Macintosh environment particularly, manufacturer's rights are well protected by network software; external circulation would negate this protection.
<table>
<thead>
<tr>
<th>SHELF</th>
<th>TITLE OF SOFTWARE</th>
<th>COMP VERS</th>
<th>#</th>
<th>COPY MANUFACTURER</th>
<th>SUBJECT</th>
<th>ZMNDARY</th>
<th>NOTES AND HISTORY FIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>ABBSTAT 5.10</td>
<td>IBM</td>
<td>5.10</td>
<td>1 ANDERSON BELL</td>
<td>STATS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>ACTION PLANNER (3.5&quot;)</td>
<td>IBM</td>
<td>1988</td>
<td>1 POWER UP</td>
<td>PROJECT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>ADA (JANUS)</td>
<td>IBM</td>
<td>1.4.7</td>
<td>1 RR SOFTWARE</td>
<td>LANG</td>
<td></td>
<td>[DOS 2.2X]</td>
</tr>
<tr>
<td>A6</td>
<td>ADA (JANUS)</td>
<td>IBM</td>
<td>1.4.7</td>
<td>1 RR SOFTWARE</td>
<td>LANG</td>
<td></td>
<td>[CP/M-86]</td>
</tr>
<tr>
<td>A9</td>
<td>ARTIFIC INTELL. &amp; Expert Systems</td>
<td>IBM</td>
<td>1987</td>
<td>2 INTEL TUTOR</td>
<td>ART. INT</td>
<td>Intelligent Tutoring</td>
<td></td>
</tr>
<tr>
<td>A12</td>
<td>ASKSAM 4.2</td>
<td>IBM</td>
<td>4.2</td>
<td>1 ASKSAM SYSTEMS</td>
<td>DATA</td>
<td></td>
<td>UPGRADED FROM 4.1</td>
</tr>
<tr>
<td>A21</td>
<td>AT I DBASE III PLUS TRAINING</td>
<td>IBM</td>
<td>3.07</td>
<td>1 AMER TRAINING TUTOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A21</td>
<td>AT I LOTUS 1-2-3 TRAINING</td>
<td>IBM</td>
<td>2.29</td>
<td>1 AMER TRAINING TUTOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A24</td>
<td>AT I VOLKSWRITER DELUXE</td>
<td>IBM</td>
<td>2.3</td>
<td>1 AMER TRAINING TUTOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A27</td>
<td>AT I WORDPERFECT</td>
<td>IBM</td>
<td>3.07</td>
<td>1 AMER TRAINING TUTOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A30</td>
<td>AUTHOR'S ANALYST</td>
<td>IBM</td>
<td>1984</td>
<td>1 MDS SOFTW ASW</td>
<td>WORD</td>
<td>UTILITY</td>
<td></td>
</tr>
<tr>
<td>A33</td>
<td>AUTOCAD 2.62</td>
<td>IBM</td>
<td>2.62</td>
<td>1 AUTODESK</td>
<td>GRAPHIC</td>
<td></td>
<td>UPGRADED TO 2.62 FROM 2.1</td>
</tr>
<tr>
<td>A36</td>
<td>AUTOSORT/B6M</td>
<td>IBM</td>
<td>1.17</td>
<td>1 COMPUT CONTO</td>
<td>UTILITY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>BALANCE OF POWER (POLITICS)</td>
<td>IBM</td>
<td>1985</td>
<td>3 MINDSCAPE</td>
<td>EDUC</td>
<td>POLITICS</td>
<td></td>
</tr>
<tr>
<td>S6</td>
<td>BARROWS COMPUTER STUDY FOR SAT</td>
<td>IBM</td>
<td>1.2</td>
<td>1 BARROW'S</td>
<td>EDUC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H30</td>
<td>BASIC COMPILER (SEE MICROSOFT)</td>
<td>IBM</td>
<td>0</td>
<td>0 MICROSOFT</td>
<td>LANG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B5</td>
<td>BASS BASE PRODUCT</td>
<td>IBM</td>
<td>85.32</td>
<td>1 BASS INST INC</td>
<td>LIBRARY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B6</td>
<td>BIBLIOGRAPHY GENERATOR</td>
<td>IBM</td>
<td>1987</td>
<td>1 EDUC ACTIV</td>
<td>WORD</td>
<td>UTILITY</td>
<td></td>
</tr>
<tr>
<td>B9</td>
<td>BOOKDEX</td>
<td>IBM</td>
<td>1.2</td>
<td>1 CAPITOL SYST</td>
<td>LIBRARY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B12</td>
<td>BRAINMAKER (3.5&quot;)</td>
<td>IBM</td>
<td>1.5</td>
<td>1 CALIF SCIE SOFT</td>
<td>SCIENCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P76</td>
<td>C 65 COMPILER (SEE PROF C COMPILER)</td>
<td>IBM</td>
<td>0</td>
<td>0 COMPU INNOVA</td>
<td>LANG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H33</td>
<td>C COMPILER (SEE MICROSOFT)</td>
<td>IBM</td>
<td>0</td>
<td>0 MICROSOFT</td>
<td>LANG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C9</td>
<td>C FOR ME</td>
<td>IBM</td>
<td>1966</td>
<td>1 COMPU INNOVA</td>
<td>LANG</td>
<td></td>
<td>NO MASTER, ONLY COPY</td>
</tr>
<tr>
<td>C12</td>
<td>C GRAPHICS (BOOK)</td>
<td>IBM</td>
<td>7</td>
<td>1 KERN INTERN.</td>
<td>LANG</td>
<td>UTILITY</td>
<td>BY M.J. NOVACK</td>
</tr>
<tr>
<td>C13</td>
<td>CALCULUS</td>
<td>IBM</td>
<td>1.0</td>
<td>1 TRUE BASIC</td>
<td>EDUC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C14</td>
<td>CDEX TEACH YOURSELF LOTUS</td>
<td>IBM</td>
<td>1984</td>
<td>1 CDEX</td>
<td>TUTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Vendor</td>
<td>Version</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C15</td>
<td>CERTIFICATE MAKER</td>
<td>IBM</td>
<td>1986</td>
<td>SPRINGBOARD GRAPHIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C18</td>
<td>CHARTMASTER 6.21</td>
<td>IBM</td>
<td>6.21</td>
<td>ASHTON-TATE GRAPHIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C21</td>
<td>CLIPPER DBASE III COMPILER</td>
<td>IBM</td>
<td>1985</td>
<td>NANTUCKET LANG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C24</td>
<td>CLOUD</td>
<td>IBM</td>
<td>1984</td>
<td>MICRON UTIL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C25</td>
<td>COLOR MAGIC</td>
<td>IBM</td>
<td>1.0</td>
<td>LIFETREE GRAPHIC</td>
<td>DONATED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C26</td>
<td>COMPANY LADDER</td>
<td>IBM</td>
<td>1.0</td>
<td>POWERUP GRAPHIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3</td>
<td>COMPUTER PREPARATION FOR SAT</td>
<td>IBM</td>
<td>18</td>
<td>CORONADO EDUC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>CRYSTAL (DIFPAT)</td>
<td>IBM</td>
<td>1987</td>
<td>SCI SOFT SERV SCIENCE</td>
<td>FREE UPGRADE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>CRYSTAL (POLEFIGURE)</td>
<td>IBM</td>
<td>1987</td>
<td>SCIENTIFIC SOFT SCIENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>CRYSTAL (STERECUBE)</td>
<td>IBM</td>
<td>1987</td>
<td>SCIENTIFIC SCIENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>CRYSTAL (STEROGRAM)</td>
<td>IBM</td>
<td>1987</td>
<td>SCIENTIFIC SCIENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C27</td>
<td>CRYSTAL (XRAY CRYSTALLOGRAPHY)</td>
<td>IBM</td>
<td>1987</td>
<td>SCIENTIFIC SCIENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D8</td>
<td>DBASE III PLUS 1.1</td>
<td>IBM</td>
<td>1.1</td>
<td>ASHTON-TATE DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>DBASE III PLUS APPLIC. LIBRARY</td>
<td>IBM</td>
<td>1986</td>
<td>QUE DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>DBASE III PLUS SAMPLER</td>
<td>IBM</td>
<td>1986</td>
<td>ASHTON-TATE DATA</td>
<td>7 MANUALS W/DRAWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D12</td>
<td>DESK COMMANDO</td>
<td>IBM</td>
<td>1986</td>
<td>TANSTAAFL SOFT DESKTOP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D15</td>
<td>DIFFERENTIAL &amp; DIFF. EQUAT.(BOOK)</td>
<td>IBM</td>
<td>1986</td>
<td>SPRINGER VERLAG SCIENCE</td>
<td>BY MUSEYN KOCAX SOFTWARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M37</td>
<td>DOS (SEE MICROSOFT LEARNING DOS)</td>
<td>IBM</td>
<td></td>
<td>TUTOR OPER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D18</td>
<td>DIALOGUE</td>
<td>IBM</td>
<td>1.31</td>
<td>COMTECH PUBL UTILITY</td>
<td>RCD 10/86</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D21</td>
<td>DUET PRINTER UTILITY 1.14</td>
<td>IBM</td>
<td>1.14</td>
<td>CSI UTILITY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>ENABLE</td>
<td>IBM</td>
<td>1.0</td>
<td>SOFTWARE GROUP INTEGR</td>
<td>DONATED FREE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E6</td>
<td>EUREKA: THE SOLVER</td>
<td>IBM</td>
<td>1986</td>
<td>BORLAND SCIENCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E9</td>
<td>EXECUTIVE TRAINING WHEELS</td>
<td>IBM</td>
<td>1.00</td>
<td>PRACTICORP W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E12</td>
<td>EXPERT 4</td>
<td>IBM</td>
<td>1985</td>
<td>ELSEVIER-BIOSOFT DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E15</td>
<td>EXPLORING PASCAL (BOOK)</td>
<td>IBM</td>
<td>1985</td>
<td>ASHTON-TATE LANG</td>
<td>BY JEFFREY LILL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>FANCY FONT</td>
<td>IBM</td>
<td>1986</td>
<td>SOFTCRAFT GRAPHIC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>FARSDAT</td>
<td>IBM</td>
<td>1986</td>
<td>INTERFACE TECHN INTEGR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>FASTTRAX</td>
<td>IBM</td>
<td>3.91</td>
<td>BRIDGEWAY PUB UTIL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F9</td>
<td>FILE CLERK</td>
<td>IBM</td>
<td>1986</td>
<td>POWER UP DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F15</td>
<td>FILE EXPRESS</td>
<td>IBM</td>
<td>PUBLIC?</td>
<td>EXPRESSWARE DATA</td>
<td>NO MASTER, ONLY COPY</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SECURITY

Location of Software

All software which is distributed for use via diskette is maintained on closed shelves in the LRD.

Management of Hard Disks

Some software is maintained on network file servers, and other packages are mounted on user-accessible hard disks. In the case of the network (Macintosh Appletalk), software is handled by a network server and is read only and noncopyable. The network administrator is the only individual who has access privilege to change the status of software.

Hard disks are patron-accessible. The LRD places all normal warning signs regarding copying software, and loads only that portion of the programs needed for use. Any segment which is utility-, installation-, or modification-oriented is not loaded. All software is loaded in read-only sectors of the hard disk to decrease the problem of inadvertent patron destruction of the software.

Handling Procedures, Staff, and Patron

Diskettes are checked out to patrons upon surrender of their A&M identification card. Cards are returned upon relinquishing of the software. Packages are checked for full diskette complement, but diskettes are not checked for either operability or viral infection. Patrons are asked to take only one program at a time.

Preservation

Preservation of working copies is not an issue at the LRD. Diskette programs are expected to have an operational life of from seven to 180 days, depending on the program's popularity. Under peak use, a diskette program may have to be reloaded on a diskette every week.

Actual life of a diskette also varies greatly with one semester probably the average; for popular programs operated by inexperienced users, sixty days is a long life. It is sometimes shocking to see the condition of a diskette after only a week of use. "Folded, spindled, and mutilated" often seems the appropriate description of their condition. Beyond the maintenance of user copies and the archiving of a backup copy, no preservation activities are undertaken for diskettes.

It should be noted here that proper cleaning and maintenance of equipment, including regular disk drive cleaning, is a "preservation" technique for both the hardware and the software.
Role of Related Computing Centers

Currently, the LRD is the only campus computer lab to provide a rich collection of software for evaluation and testing. Other labs are only just beginning to provide even basic software for general student use and do not yet provide adequate support for the present demand. Most other labs on campus are administered by the Computing Services Center, which plans to greatly increase the number of microcomputers available to students for general computing purposes. Currently, only 800 microcomputers are provided in computing facilities operated by the Computing Services Center. Should that number increase, along with an increase in the variety of software available, the demand for services in the LRD could decrease.

Copyright and Other Considerations

Backups of Software. Copyright law allows backup of software to protect from inadvertent erasure. The LRD maintains a backup copy of all software in the collection in a locked master copy cabinet. In addition, the LRD makes a backup copy of all diskettes received in books in the general collection and archives that backup copy in the same locked software cabinet.

Backups of Documentation. A master copy of the complete manual of each computer program owned is kept in closed shelving in the area. Optimally, this should be a room with a lock and high security. The file includes all supplemental documentation available for European functions, special graphics information, printer charts, etc.

Multiple Copies. Wherever necessary, multiple copies are acquired to meet user or faculty needs. The Evans Library has many single copy programs, but there are up to forty copies of the most heavily used software programs. Of the 257 IBM titles, 23 percent have multiple copies and 18 percent of the Mac titles have multiple copies. In Lab B's collection, 99 percent of the titles have multiple copies; in Lab C's, 50 percent; and in Lab D's, only 10 percent. In Hess's study, the average percentage of titles with multiple copies was 17; the percentage per lab ranged from 100 downward to 2 (Hess, 1987, p. 6).

Staff Training and Service

In most library computer operations, lack of adequate or adequately trained staff dictates a minimum level of service. A desirable level of service would include at least some application software assistance. In the LRD, application software assistance is given to users as staff availability and knowledge allows. This level
of assistance is limited to major packages owned by the LRD and is never attempted for packages users bring into the area. In particular, the LRD will not attempt to provide printer support or printing assistance for user-owned software.

If a unit is staffed and supported to provide full service, the types of service provided are best determined by a user needs analysis and a software needs analysis. In doing a needs analysis, care must be taken to distinguish between "needs" and "desires." For example, availability of color printing options is a desire, but rarely a need in a teaching lab.

**Special Services**

Some special services are so basic, however, that they should be supported in virtually all labs. Disk recovery is a primary example. Rarely does a day go by that some student does not request help in recovering data from a disk. Since the LRD's primary mission is educational support, failure to help a student recover a paper due in two hours would constitute gross nonsupport. Use of standard tools, including *Norton Utilities*, *Mace*, and *PC Tools* allow for recovery of a significant percentage of "lost" files. Nothing, however, can recover the files of a disk which has been mutilated in a backpack or attached to the refrigerator with a magnet.

With the four common disk formats in the IBM environment and the two disk formats in the Macintosh environment, format transfers are a regular need in a large computer operation. We believe that it is the responsibility of a lab to provide for transfer of the common formats in use on the campus. Provision of format transfer for all possible formats, however, is not required. In the LRD, all IBM and Macintosh formats are handled but not Apple II, TRS-80, Atari, Amiga, or other formats not used in university teaching programs.

One helpful service which could be offered is that of OCR digitizing. Even with moderately priced equipment, an acceptable job can be done in this area. The LRD has made available a text scanning station for several years with some success. After a short training session, users operate the equipment themselves, and report general satisfaction with the service.

Along with OCR scanning, graphics digitizing is a frequently requested service. With the capabilities of word processors in both the IBM and Macintosh environments, and the availability of laser printers, papers with embedded graphics are becoming very common. In particular, writers of theses and dissertations are very interested in such options as are faculty who prepare camera-ready copy for journal use. The LRD currently does not offer this service, but it is available on campus.
Training Staff to Give Appropriate Level of Service: Hardware and Software

Staff training for supported software is a critical area and one which deserves significant attention. The difficulty, as is normally the case, is finding the time to train staff members and still provide basic service. The LRD operates a fee-based teaching program for WordPerfect and Lotus 1-2-3 and plans to offer a course in Microsoft Word in the future. Staff can enroll in those courses as space allows. In addition, internal classes for library staff only are offered by the same teacher. Presently, no DOS course is available in the LRD. The Computing Services Center does offer a DOS course along with many others.

An alternative method of teaching is the use of diskette-based training tools such as the American Training Institute (ATI) programs. These programs are adequate to teach staff the minimal skills for each program and sometimes offer advanced training packages. The advantage of such tools is the flexibility of learning at the user's own speed and convenience. The LRD has used such programs in the past, but new versions to match changes in software are still being sought.

Much of the routine assistance with software is provided by student assistants particularly in the evenings and on weekends. While the regular staff of the LRD does provide microcomputer support, their duties include selection, maintenance, and servicing of audiovisual materials as well. Figure 3 shows the percentage of

<table>
<thead>
<tr>
<th>Staff Level</th>
<th>Microcomputer Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Assistant II</td>
<td>30%</td>
</tr>
<tr>
<td>Clerk III</td>
<td>90%</td>
</tr>
<tr>
<td>Clerk II</td>
<td>35%</td>
</tr>
<tr>
<td>Clerk II (1/2 time)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 3. LRD staff and percent of time devoted to microcomputer support.
LRD staff time devoted to microcomputer support. Not included is that of the the division head (Hall), who is active in the selection of software and the setting of policies, but who also oversees two other departments as well.

CONCLUSION

The LRD is one of the busiest units in the Evans Library. Users spend more than 6,000 hours per week in the LRD using the 144 microcomputers available. While software is expensive to purchase, it is a high use item, and the inclusion of a software lab as part of the library's activities is easily justified. One of the criterion for the selection of LRD staff is that they must be adaptable and willing to accept change. Much has changed since the LRD's beginning in 1979. These changes have, however, brought progress and increased support for the unit from the university administration and from users.

ACKNOWLEDGMENTS

Thanks to Scott McCullar and David Magnusson for their assistance in developing LRD data and tables.

REFERENCES


Software for Patron Use: Case Studies from Public Libraries

PATRICK R. DEWEY

ABSTRACT
This article addresses issues related to patron-use software in a public library setting. Software selection criteria are presented. Descriptions of categories of patron-use software and services, such as public domain software, bulletin board systems (BBS), and packages for the handicapped, are followed by one or more case studies of their applications. Practical rules of thumb drawn from experience are shared. Sources of information are provided.

INTRODUCTION
The microcomputer age has brought with it a wealth of possibilities and problems. Libraries have not been left out of this quandry. While the most obvious benefit to the profession has been the in-house use of microcomputers to automate specific tasks and systems, especially for very small- and medium-sized libraries, public access microcomputers have also made substantial headway and are exceedingly popular with patrons. In fact, microcomputers in public libraries were initially seen as a patron service. Only recently did they become a substantial aid to public library staff, probably because of the time required to develop adequate software for library work. Software for patron use has existed as early as 1980.

Some justification exists for the public access microcomputer. In the early 1980s, few people owned a microcomputer; there was much greater need and demand for this service in a library. In the early days too, computer literacy was a much more important issue. Everyone wanted to learn about microcomputers, but few people had
any place to use one. Even today some people still lack access to a microcomputer, and many desire to learn about it for the first time. Many children and adults alike are still computer illiterate.

Since libraries began providing microcomputer access in 1977 (Shair, 1977, p. 36), the number has steadily increased. As of 1990, approximately 50 percent of all public libraries provide public access micros. An excellent example of this increase is found in the Chicago Public Library. A survey by Garber in 1989 (Dewey, 1990, p. 4), showed that over one-third of all branch libraries at the Chicago Public Library had public access microcomputers. Just a few years earlier there was only one public access microcomputer.

**Selection Issues**

*Software Selection Criteria*

1. Since library staff have minimal time available to assist the public, software packages should be reasonably easy to understand or user friendly. The less help the patron needs, the fewer the problems for staff.

2. Programs that use color are a good idea, especially for children.

3. Depending upon the nature of the program, such things as capacity and capability should be considered. Word processing programs and database management systems fall into this category.

4. Some programs need to work with other programs, such as a publishing program. They should be able to import or export files to word processors for example.

5. Educational programs should be targeted at specific learning goals, or, in the case of a school, for specific curriculum needs or remediation.

6. Programs should be checked for quality, either through reviews or personal inspection.

7. Consider the noise generated by a software package and its users.

8. Keep in mind that a public library serves many types of people, from the elderly to children. Having a variety of software for people to choose from will accommodate more of these patrons. If there is no interesting software, then no one will use the computer.

9. Listening to patrons' ideas about software can be one of the most useful methods for developing a software collection. They are often well informed because of their discussions with friends, extensive reading in magazines, etc. Also, they may have some notion of what they expect the microcomputer to do without having a specific package in mind. The librarian can then try to find such a package for purchase.
Suggestions for Purchase

1. Libraries should also consider tutorials, which are programs that explain other programs.
2. Programs which mimic some traditional intellectual board games, such as chess, are a good choice for public libraries.
3. Preschool children and their parents are a group served by public libraries. Software exists for learning colors, shapes, and numbers. These can be used by parents and their children.
4. Interactive fiction is a category of software that is similar to a book. Users take the role of a character and try to solve a mystery or puzzle. These programs may be entirely text or have graphics. Since they often promote or require significant amounts of reading, they are usually a good type of program for a public library to make available.

Categories of Patron-Use Software and Services

It is quite easy to separate the types of public access software selection into many specific categories. This was done in a more detailed approach elsewhere (Dewey, 1990, p. 4). For the purposes of this article, however, these are broken down into six major categories: in-library use, circulating software, public domain software and shareware, electronic bulletin boards, handicapped access, and laboratory use. This article will examine each type of software and related service issues. Most categories are followed by an actual case study. As with any aspect of service it is important for a library to assess the needs of the community. In an affluent community, in-library use may be minimally desirable, while circulation of software may be more important. Not all libraries are the same and not all patrons want the same thing.

In-Library Use

In-library public access is the most frequent type of software service established by a public library. Patrons usually have to make an appointment. A selection of software is available to users and/or they may be allowed to bring their own. Software selection for such a service is a big issue. An excellent example of this type of service was provided by the North-Pulaski Neighborhood Library (Chicago Public Library), which maintained a highly publicized Personal Computer Center from 1981 to 1989. It was funded by a grant from the Friends of the Library. Using only an Apple II computer (later replaced with an Apple IIe), in-library access and other services were provided.

The in-library service presented several problems for resolution. Most immediate among these was space. After much consideration,
a closet was cleared out and provided a secluded space. The closet was also the only place that could be locked when not in use and made secure. A selection of public domain and commercial software, mostly educational game software, was obtained. Since few libraries had any experience with this service, knowing how to correctly help patrons with such software was a major concern. An initial effort was made to spend some time tutoring patrons, but this quickly proved to be very difficult. Getting patrons together in groups also proved to be difficult and time consuming. The most efficient route was to simply give each patron a five or ten minute talk about how the computer works and how to insert the diskettes. Patrons then worked through a tutorial disk on how the computer works in greater detail. They were given additional help only as needed ("Help me, I'm stuck!"), and only enough instruction was given to get them unstuck. It was the patron's responsibility to learn how to use the computer. Library staff merely helped out occasionally. This strategy worked very well (Dewey, 1982, p. 880). The library also operated the first public access library bulletin board service (Dewey, 1984, p. 13).

The Maywood (Illinois) Public Library has had a microcomputer service in place for approximately eight years. The main service is in-library use. Originally the computer was housed on the second floor, but staff found it too difficult to administer service since patrons needed to go to one floor to make an appointment and another to use the computer. In addition, the staff on the computer floor were generally too occupied with children's programs to have sufficient time to monitor the machine. The microcomputer was ultimately moved to a lower level of the library where a single staff member took care of the videotape collection, the computer, the fax machine, the copy machine, and similar services. This has worked out extremely well (Dewey, 1990, p. 97). Another form of the in-library center is that targeted at a specific group, such as a career center which makes available college search programs, grammar and spelling tutorials, resume writing programs, and study programs for examinations such as GED and ESL (Dewey, 1990, p. 104).

**Circulation of Software**

Circulating software outside the library has many pitfalls. The first pitfall occurs with the selection of software. A problem peculiar to circulation and use of software is concern for copyright and licensing agreements. Generally speaking, if the copyright states that the disk is sold to be used on only one CPU (Central Processing Unit), then the program should not be circulated. Otherwise, the disk can generally be treated as a book. Since interpretations of the copyright laws will vary, it is wise to have the library attorney review
such a process and be asked for an opinion regarding state and federal laws.

Software that circulates is also prone to much more damage and loss than other software. Should the library circulate a $175 package? What happens if it is lost or damaged? What happens if several patrons want the same package?

Public Domain Software and Shareware

The Liverpool (New York) Public Library provides a spectacular example of a circulating software collection in a public library. It has had an innovative and exciting program for many years, with a local area network and an electronic bulletin board. Recently, software was allowed to circulate. Many types of software are circulated, including arcade games. The circulation of software has been the most interesting aspect at Liverpool since it is the largest of its kind to be found. Some 10,000 packages are circulated each year. Software packages which are of short-term interest to parents and children are some of the main purchases. Significant problems have included methods of packaging the software so that it is returned intact. When software is returned, it is inspected visually. Disks are write protected when possible, and an archival copy is made whenever convenient. Only 5 percent of the collection is sitting on the “dead” shelf at any one time waiting for further processing (Dewey, 1990a, p. 29).

One solution to copyright and physical access problems is public domain software and shareware. These types are sometimes mistaken as the same thing, but they are quite different. Public domain software has no copyright and may be freely copied and used by anyone. Shareware, on the other hand, is copyrighted. It may be copied and distributed but should not be used for more than a preview without sending in a registration fee. One purpose of this arrangement is to allow the user time to become acquainted with the software before deciding to purchase. Often a fuller version and other “perks,” such as documentation, are supplied when the registration is submitted. Such software, public domain or shareware, can be mass produced by a library to serve as many patrons as desired. Copies can be made on demand from a master set. When a copy is returned, it is simply put back into the “scratch bin” where it can be reformatted for other uses. In this case, there is no need to check the disk for damage.

Electronic Bulletin Board Systems

A BBS is an online database which the library operates on its microcomputer. Only between 50 and 100 libraries have operated an electronic bulletin board system. Such an operation is tricky at best.
It may contain files that publicize library activities, information files, bibliographies, bulletins from callers, electronic mail between users, public domain software, and many other services. Users may dial in from home using their own microcomputers and modems.

The Suburban Library System (Illinois) obtained funding for an electronic bulletin board system for member libraries. The goal was to provide a variety of information to patrons in the areas served by the community libraries. Funded by an LSCA grant, the service made available an online database of basic library information—bibliographies, sources of information, special services, and much more. An electronic mail service, and book and movie reviews were also provided. A number of subboards allowed users to focus in on particular topics for discussion, posting bulletins which were then the subject of debate by other users. One subboard was a "storyboard." Users could create their own story by drafting a first installment. Subsequent callers would then build on this to enlarge the story. Some stories ended with thirty or forty installments. Getting young people into the habit of writing was considered a good use for the board. The board operated for three years and received over 11,000 phone calls.

In order to provide a BBS service in a public library, staff must be aware of patron-use issues and software selection. Information on the basic operation and use of a BBS, including the search for software, is covered in an excellent book entitled Using Computer Bulletin Boards (Hedtke, 1990).

Patrons can locate BBS numbers in a variety of sources including the National Directory of Bulletin Board Systems Computer Shopper and CompuServe. The best way to learn about the operation of a BBS is to call local boards and discuss the operation with local system operators (sysops). Another type of software that should be considered for purchase is that for running an electronic bulletin board system. It should be easy for patrons to use and have those features which the library feels are important. Many types of BBS software are now available. A 1200 or 2400 baud modem is also essential for operating a BBS.

Handicapped Access

There has been significant progress in using microcomputer technology to make media available to the handicapped. These include software packages that enlarge type, convert from print to voice, and use sign language on screen.

The Special Needs Center of the Phoenix (Arizona) Public Library serves the needs of handicapped individuals. Federal funding and private gifts of over $156,000 made the center possible. A host
of hardware and software are available. The variety of microcomputers include IBMs and Apples. Software packages include Raised Dot Computing for large print, braille, and synthetic voice. The InLarge software is available on the Macintosh. This program creates large print computer screen windows. Interpreter (Microtech Consulting) is a sign language program. The lab has many volunteers who train users in the skills needed to operate the machines and use the software. People use the center for school work, and to read newspapers and books in braille or voice, and it generally provides library services to a group which could not formerly benefit. It has been highly successful (Dewey, 1990, p. 49).

Laboratory Use

The Nichols Public Library (Naperville, Illinois) has an excellent public access laboratory (Dewey, 1990, p. 46). It also makes available many business and advanced software programs for these computers. Time must be reserved, and software is cataloged in the library's online catalog. Users under the age of 8 must be accompanied by an adult 18 or older. There are also four microcomputers in the children's department. Together, these provide patrons with approximately 1,800 packages each month. Parents are commonly seen with their children using the micros. The lab has some 100 packages displayed in a glass cabinet. Use of the service increased 25 percent during 1989. The public has been very supportive of these services.

General Guidelines for Establishing Software Collections

Most librarians can select software by using standard tools, reading reviews, and becoming experienced in using software. Potential problem areas should be looked at in order to minimize their effects. Principal areas to examine include:

1. Find a suitable location to put the computer, software, and staff.
2. Select a staff member to be in charge of software selection and other microcomputer operations. In order for selection to be done correctly, someone dealing with the computer-using public should be in charge. Input should be invited from both the public and interested staff.
3. Teach staff how to use the microcomputer.
4. Create a system for teaching the public to use both computer and software. Since time is at a premium, this should be done in brief sessions. Most librarians only have time and skills to help the patron get started, not to give lessons in using dBme for example.
5. Create a budget for software purchases.
6. Create a software selection policy. Software selection always requires a definition of the needs for it. While it can be done quite successfully without a written policy, such codification will usually prove valuable.
7. Develop a system for organizing the software—the simpler, the better. The system should make it easy to check out and to identify what software is available. Several good methods exist for making access to titles available to patrons (Dewey & Garber, 1984, p. 32).
8. Create necessary rules for regulation and control of operation. Some rules, especially about copyright violation should be posted. Commonly, libraries provide copies of an agreement which users must sign each time they use the software. This spells out their obligations and possible violations of copyright laws.
9. Choose a way to package software. Storage containers should be sturdy enough to easily rest on shelves for storage, to survive rough handling, and, if circulation out of the building is permitted, to be carried around like a book.
10. Make a periodic evaluation of the software collection. Weed out obsolete or nonworking materials. Determine areas of future selection.

Sources of Software Information

Available sources of software information include books, magazines, newsletters, and online. There are almost too many sources. Fortunately, a selector may focus on a few sources that regularly review materials of interest. Some examples of review sources for patron-use software are given below.

Many magazines exist which contain excellent and current software information. Booklist (American Library Association) regularly features software of interest to librarians selecting for public access. Other library periodicals do the same. Other professional journals, such as Computers In Libraries (Meckler), also occasionally carry reviews of public access software, particularly from a librarian's point of view. An excellent no cost journal is Apple Computer Users Group Newsletter (Apple Computer). Only the Best is published every year or two. It contains reviews of hundreds of preschool to 12th grade software packages, with ratings by different organizations. A+ is an Apple magazine which reviews the latest games and educational software. Ahoy is an excellent Commodore journal, largely devoted to young people. Reviews and commentary will keep one up to date on materials which young Commodore users will find appealing. There are many fine journals which serve the IBM and IBM clone
user. Similar magazines exist for the Macintosh, the Amiga, and other computers. There are also sources of information about public domain and shareware, including *Shareware Magazine* (PC-SIG). These popular magazines are good for keeping track of materials that are currently being used by patrons.

*Software Reviews on File* (Facts on File) is a monthly which reprints reviews from other journals. The focus is on public access software. Several reviews are reprinted for each package, making this a good way to get more than one opinion quickly.

Software directories vary in the type of information that they present. Some are collections of reviews, others are merely collections of vendor's comments. Either can be useful although both become dated rather quickly.

REFERENCES

ADDITIONAL REFERENCES
Microcomputers in Public Schools and School Libraries

JUNE H. SCHLESSINGER AND RASHELLE S. KARP

ABSTRACT
School librarians were surveyed in 1982, 1986, and 1990 in order to follow the status of the introduction of microcomputers and their uses in public schools and school libraries. Results of the surveys are presented and discussed. Librarians from selected representative schools were interviewed to obtain more in-depth information about experiences with using microcomputers. In the schools surveyed, the percentage of schools holding microcomputers seems to have stabilized at around 90-95 percent. The number of computers held per school has shown a dramatic increase over the eight-year period. Brands of computers held have varied over the years, but Apple and IBM seem to be the brands of choice today. Microcomputers are distributed through all types of school libraries at all levels. Uses of computers in school libraries are basically for educational support including some online searching and for library management and administration.

INTRODUCTION
Through surveys conducted in 1982, 1986, and 1990, the authors have followed the status of the introduction of microcomputers and their uses in public schools and school libraries in Texas and Pennsylvania (Schlessinger, 1983; Karp, 1986; Schlessinger, 1986; Schlessinger, 1987). A review of the literature reveals no other such historical statistical studies, although Information Power (1988)
provides some interesting data about this area.

This article compares the preliminary 1990 survey results from Texas and Pennsylvania to previous results and presents the results of selected case studies. The surveys used the same methodology and consisted of:

- random selection of fifty schools in each of three categories (elementary, junior high, and high school) from the state's educational directory;
- distribution of a simple questionnaire designed to determine:
  - whether microcomputers belonging to, and controlled by, the school system were on the premises, and, if so, how many and of what model;
  - whether any of the microcomputers held by the school were located in and supervised by the library, and, if so, what uses were being made of the equipment;
  - where, in addition to the library, the microcomputers were being used; and
  - comments on the future of microcomputers in schools and school libraries.

Survey Results

Table 1 indicates the percentage of return of questionnaires by type of school for the 1986 and 1990 surveys in Texas and Pennsylvania. The percentages of return and the speed of return for all the surveys were relatively high, reflecting a continued high interest in microcomputers among school librarians. The 1990 results show a surprising uniformity of interests across the public school spectrum, even more noticeable than that exhibited on previous surveys. The almost equal percentages of return for the surveys for each state are also interesting.

Number of Microcomputers

Table 2 presents the data for the percentage of public schools in Texas and Pennsylvania holding microcomputers. Table 2 suggests that the percentage of public schools in Texas holding microcomputers has stabilized at around 90 percent, with the picture remarkably similar across the spectrum of schools. In Pennsylvania, the percentage of public schools holding microcomputers seems to have stabilized at about 95 percent, with similar numbers across all levels. Unlike both the 1982 and 1986 Texas surveys, in which schools not holding microcomputers were looking forward to a future that included microcomputers, the schools not holding microcomputers in the 1990 (Texas) survey were generally not expecting a change in their status in the near future. In contrast to this, schools in Pennsylvania with lower microcomputer holdings indicated that the
trend toward microcomputer laboratories in schools should increase holdings at all levels. The only group that seemed somewhat discouraged were elementary school librarians, who indicated that the elementary schools were forced to take castoffs from upper level schools rather than purchasing newer and more appropriate hardware.

**Brands of Microcomputers**

Tables 4, 5, and 6 compare the holdings of brands of microcomputers in each type of school for each year surveyed.

### Table 1.
**Returns of Questionnaires by Type of School-1986 and 1990.**

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Texas</th>
<th>Pennsylvania</th>
<th>Texas</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>28 (56.0)</td>
<td>41 (82.0)</td>
<td>31 (62.0)</td>
<td>38 (76.0)</td>
</tr>
<tr>
<td>Junior High</td>
<td>30 (60.0)</td>
<td>39 (78.0)</td>
<td>20 (40.0)</td>
<td>42 (84.0)</td>
</tr>
<tr>
<td>High School</td>
<td>27 (54.0)</td>
<td>45 (90.0)</td>
<td>30 (60.0)</td>
<td>35 (70.0)</td>
</tr>
<tr>
<td>Totals</td>
<td>85 (56.7)</td>
<td>125 (83.0)</td>
<td>81 (54.0)</td>
<td>115 (76.7)</td>
</tr>
</tbody>
</table>

### Table 2.
**Percentage of Public School Respondents Holding Microcomputers in 1986 and 1990**

<table>
<thead>
<tr>
<th>Type of School</th>
<th>Texas</th>
<th>Pennsylvania</th>
<th>Texas</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>25 (89.3)</td>
<td>39 (95.1)</td>
<td>29 (93.5)</td>
<td>36 (94.7)</td>
</tr>
<tr>
<td>Junior High</td>
<td>27 (90.0)</td>
<td>36 (92.3)</td>
<td>19 (95.0)</td>
<td>42 (100.0)</td>
</tr>
<tr>
<td>High School</td>
<td>26 (96.3)</td>
<td>45 (100.0)</td>
<td>28 (93.3)</td>
<td>34 (97.1)</td>
</tr>
<tr>
<td>Totals</td>
<td>78 (91.8)</td>
<td>120 (96.0)</td>
<td>76 (93.8)</td>
<td>112 (97.4)</td>
</tr>
</tbody>
</table>
TABLE 3.
AVERAGE HOLDINGS OF MICROCOMPUTERS PER SCHOOL IN PUBLIC SCHOOLS—1990

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>TX</th>
<th>PA</th>
<th>TX</th>
<th>PA</th>
<th>TX</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>20.0</td>
<td>13.7</td>
<td>22.8</td>
<td>25.4</td>
<td>23.3</td>
<td>38.9</td>
</tr>
<tr>
<td>IBM</td>
<td>6.1</td>
<td>2.2</td>
<td>4.7</td>
<td>4.1</td>
<td>20.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Radio Shack/Tandy</td>
<td>1.5</td>
<td>1.0</td>
<td>3.2</td>
<td>3.4</td>
<td>5.2</td>
<td>8.2</td>
</tr>
<tr>
<td>Commodore</td>
<td>0.6</td>
<td>0.1</td>
<td>4.1</td>
<td>2.4</td>
<td>0.2</td>
<td>1.4</td>
</tr>
<tr>
<td>All Others</td>
<td>1.2</td>
<td>0.5</td>
<td>3.2</td>
<td>0.1</td>
<td>5.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Total Schools</td>
<td>25.0</td>
<td>41.0</td>
<td>27.0</td>
<td>39.0</td>
<td>26.0</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Average Holdings by Type of School:

<table>
<thead>
<tr>
<th></th>
<th>TX</th>
<th>PA</th>
<th>TX</th>
<th>PA</th>
<th>TX</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>29.4</td>
<td>17.5</td>
<td>38.0</td>
<td>35.4</td>
<td>53.8</td>
<td>70.8</td>
</tr>
<tr>
<td>Junior High</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>40.5</td>
<td>41.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE 4.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>1990</th>
<th>1986</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>20.0</td>
<td>9.1</td>
<td>5.2</td>
</tr>
<tr>
<td>IBM</td>
<td>6.1</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Radio Shack/Tandy</td>
<td>1.5</td>
<td>1.2</td>
<td>2.2</td>
</tr>
<tr>
<td>All Others</td>
<td>1.8</td>
<td>4.3</td>
<td>2.0</td>
</tr>
<tr>
<td>Average Holdings</td>
<td>29.4</td>
<td>14.7</td>
<td>9.1</td>
</tr>
</tbody>
</table>

TABLE 5.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>1990</th>
<th>1986</th>
<th>1982</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>22.8</td>
<td>11.4</td>
<td>13.4</td>
</tr>
<tr>
<td>IBM</td>
<td>4.7</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Radio Shack/Tandy</td>
<td>3.2</td>
<td>2.7</td>
<td>8.7</td>
</tr>
<tr>
<td>All Others</td>
<td>7.3</td>
<td>7.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Average Holdings</td>
<td>38.0</td>
<td>21.7</td>
<td>25.3</td>
</tr>
</tbody>
</table>
Table 6.


<table>
<thead>
<tr>
<th>Brand Name</th>
<th>1990 TX</th>
<th>1990 PA</th>
<th>1986 TX</th>
<th>1986 PA</th>
<th>1982 TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>23.3</td>
<td>38.9</td>
<td>12.2</td>
<td>19.1</td>
<td>5.4</td>
</tr>
<tr>
<td>IBM</td>
<td>20.0</td>
<td>19.0</td>
<td>0.6</td>
<td>2.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Radio Shack/Tandy</td>
<td>5.2</td>
<td>8.2</td>
<td>9.4</td>
<td>6.7</td>
<td>2.8</td>
</tr>
<tr>
<td>All Others</td>
<td>5.3</td>
<td>4.7</td>
<td>3.0</td>
<td>3.0</td>
<td>2.2</td>
</tr>
<tr>
<td>Average Holdings</td>
<td>53.8</td>
<td>70.8</td>
<td>25.2</td>
<td>31.4</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Discussion

The 1990 data for Texas and Pennsylvania (two very dissimilar states in widely separated geographic locations) are strikingly similar. For example, average holdings in Texas public schools of 40.5 compare to Pennsylvania's average holdings of 41.9. Texas seems to be more interested in the lower school levels with higher average holdings in both the elementary and junior high schools, while Pennsylvania shows higher average holdings at the high school level.

Average holdings at all levels continue to show dramatic increases in both states. Texas shows an increase over an eight-year period in average holdings in elementary schools from 3.1 in 1982 to 29.4 in 1990, an increase by a multiplication factor of 9.5; in junior high schools from 6.6 to 38.0, a multiplication factor of 5.8; and in high schools from 10.5 to 53.8, a multiplication factor of 5.1. For Pennsylvania, the increases over a four-year period (1986 to 1990) are: for elementary schools, 9.1 to 17.5, a multiplication factor of 1.9; for junior high schools, 25.3 to 34.4, a multiplication factor of 1.4; for high schools, 31.4 to 70.0, a multiplication factor of 2.2.

In 1982 and 1986 in Texas and in 1986 in Pennsylvania, Apple computers were the most favored brand followed by Radio Shack and Commodore with no significant holdings of any one other brand. Although Apple continued to be the frontrunner in 1990, IBM is now second, and impressively so especially in the high schools. In Texas, Radio Shack use has dropped far back and Commodore seems to be disappearing from inventories. In Pennsylvania, however, the use of Radio Shack products has increased in high schools, perhaps because of its Tandy IBM compatible line. It would seem that Apple's lead, stemming from initial marketing and popularity in schools, is being eroded by the availability and visibility of the newer IBM models and, at least in Pennsylvania, of the Tandy IBM compatible model.
MICROCOMPUTERS IN SCHOOL LIBRARIES

Turning now to the situation in school libraries, Table 7 identifies the levels of holdings of microcomputers in these areas. Survey results indicate that, in Texas, 66.7 percent of schools holding microcomputers had some of those microcomputers located in the school library. The corresponding percentage for Pennsylvania was 76.7 percent. The data indicate a steady increase in the 1980s for Texas from 19 percent in 1982 and 42.1 percent in 1986, and for Pennsylvania from 41 percent in 1986 (see earlier surveys). Further, the data continue to show distribution of holdings of microcomputers in all types of school libraries at all levels in Texas and Pennsylvania. Curiously, although the overall incidence of microcomputers in school libraries in Pennsylvania is higher than that in Texas, marked differences may be noted between the figures for holdings in elementary schools and in high schools. Further research into the reasons for these differences seems warranted.

Table 7.
SCHOOL LIBRARY HOLDINGS OF MICROCOMPUTERS (1990)

<table>
<thead>
<tr>
<th>Type of School</th>
<th>TX</th>
<th>PA</th>
<th>TX</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>25 (89.3)</td>
<td>39 (95.1)</td>
<td>15 (60.0)</td>
<td>19 (48.7)</td>
</tr>
<tr>
<td>Junior High</td>
<td>27 (90.0)</td>
<td>36 (92.3)</td>
<td>17 (63.0)</td>
<td>30 (76.9)</td>
</tr>
<tr>
<td>High School</td>
<td>26 (96.3)</td>
<td>45 (100.0)</td>
<td>20 (76.9)</td>
<td>43 (95.5)</td>
</tr>
<tr>
<td>Totals</td>
<td>78 (91.8)</td>
<td>120 (96.0)</td>
<td>52 (66.7)</td>
<td>92 (76.7)</td>
</tr>
</tbody>
</table>

USES OF MICROCOMPUTERS IN SCHOOL LIBRARIES

Table 8 presents the data on uses of computers controlled by school libraries compared to equivalent data from 1982 and 1986. The data in Table 8 for 1990 are the first indication of more imaginative use of microcomputers in school libraries. Whereas all the microcomputers in Texas school libraries in 1982 were used for drill and skill type exercises, 1986 saw a welcome increase in uses for library management/administration with continued uses in educational support. The 1986 data for Pennsylvania showed a small interest in online searching. Also interesting to note for Pennsylvania in 1986 is that some computer programming instruction was present, which has disappeared in 1990 perhaps reflecting increased dependence on commercial software. The 1990 surveys reveal continued and growing use of microcomputers for educational support and library management with specific recognized use in library functions.
(circulation, cataloging, and acquisition/selection), as well as uses in support of new technologies (desk-top publishing and online searching including CD-ROM applications). It should also be noted that use of microcomputers in Pennsylvania is heavier per school and more oriented toward online searching and less toward library management and educational support.

Table 8.
PERCENTAGE OF USES OF COMPUTERS CONTROLLED BY SCHOOL LIBRARIES

<table>
<thead>
<tr>
<th>Use</th>
<th>1990 TX</th>
<th>1990 PA</th>
<th>1986 TX</th>
<th>1986 PA</th>
<th>1982 TX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Library Administration &amp; General Management Functions</td>
<td>69.2</td>
<td>21.0</td>
<td>75.0</td>
<td>33.8</td>
<td>0</td>
</tr>
<tr>
<td>Educational Support (for Teachers and Students)</td>
<td>50.0</td>
<td>29.1</td>
<td>24.0</td>
<td>57.3</td>
<td>100</td>
</tr>
<tr>
<td>Circulation Specifically Mentioned</td>
<td>26.9</td>
<td>12.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Online Searching Including CD-ROM Use</td>
<td>13.5</td>
<td>34.8</td>
<td>0</td>
<td>8.8</td>
<td>0</td>
</tr>
<tr>
<td>Cataloging Specifically Mentioned</td>
<td>5.8</td>
<td>2.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Acquisition/Selection Specifically Mentioned</td>
<td>3.8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Desktop Publishing</td>
<td>5.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Average number of Uses of Library Microcomputers Per School</td>
<td>1.75</td>
<td>2.53</td>
<td>1.50</td>
<td>1.44</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Data for uses of microcomputers in various areas of public schools other than the library were also collected in the surveys. The major areas of use remained the same in both states in all years (math/computers, administration, English, and science), but the levels of use increased markedly, and 1990 shows broad use across the curriculum for the first time and in fourteen different areas. The library remains a major user.

Case Studies
Three representative Texas schools (one high school, one junior high, and one elementary school) were selected from the returns of the 1990 survey and were queried about their use of microcomputers,
employing a structured interview format. The questions and answers are presented here.

School Number 1. High School (Enrollment: 2,187)

Question 1a: What brands of microcomputers do you hold?
Answer: A mixture of IBM PS-2, Apple IIe, Texas Instruments, and Tandy.

Question 1b: What procedure was used to acquire these (PTA funds, district funds, etc.)?
Answer: A bond election for the district provided technology matching funds for the building. Other funding has been solicited—from PTA, principal, and book sales.

Question 1c: Why did you choose these brands in particular?
Answer: The district standardized initially with Apple for instruction and IBM for administration. Today IBM is moving into instruction because of its versatility, and Macs are also becoming common.

Question 2: Which library management uses of microcomputers (circulation, collection development, reference support, cataloging support, acquisitions, and serials control) have you made, with which software/hardware, and with what successes and difficulties?
Answer: The microcomputers are used in a networked system using software developed and serviced by Mediatrack of Dalton, Georgia, to support circulation, collection development, weeding, reference support (both online catalog and DIALOG searching), cataloging, acquisitions, equipment inventory, and electronic mail. An important use is searching on STARTEXT, a system provided by the Fort Worth Star-Telegram. Both STARTEXT and MEDIATRACK are considered "super."

Question 3: What student and teacher computer uses have been made (word processing, statistics, spreadsheets, games, drill for skill) in the library, with which software/hardware, and with what success or difficulties?
Answer: Much use is made of Bank Street Writer and Print Shop, especially by students. Software (copyright is purchased) networked from the Minnesota Educational Computer Consortium is used by both students and teachers. Considerable use is also made of Appleworks and Crossword Puzzle. Use of games is discouraged unless students program the games themselves. Teachers use grading software as well. In general, use of computers has been more enthusiastic and frequent by students rather than by teachers. As teachers receive more training, they become good users.
Question 4: Does the library control any administrative or curriculum uses of microcomputers? Any future plans?
Answer: No.

Question 5: Do you have any anecdotes about use, problems, or surprises you would care to share?
Answer: a. Parents with computer backgrounds are very interested; this is sometimes a strength and other times a great difficulty.
   b. Students with heavy home computer backgrounds often know more than the librarian, sometimes a sensitive issue.
   c. Small accidents (tripping the wrong switch) can cause great losses. They become humorous only after they are remedied.
   d. Two persons for two hours a day were once required for book check in. Now this requires only one person for one hour.
   e. Students were lined up to use the terminal even when the card catalog was available. It led to the disposal of the card catalog.
   f. One student used STARTEXT to make reservations for a Caribbean Island Vacation. One learns to think of such difficulties before they occur.
   g. Positive surprises came from the acceptance of the users, the level of service now possible, the level of reporting now possible, and the ability to relax more on the rigid policies and procedures previously in effect.

Question 6: What advice do you have for those just beginning?
Answer: The librarian needs the support of a technician, either from the software people or at the district level. It is also advisable to operate district-wide to ensure compatibility and lowest cost for the most effective use.

School Number 2. Middle School (Enrollment: 970)

Question 1a: What brands of microcomputers do you hold?
Answer: A mixture of Apple IIe, IBM, and Tandy.

Question 1b: What procedure was used to acquire these (PTA funds, district funds, etc.)?
Answer: A mixture of district and PTA funds supported the purchase.

Question 1c: Why did you choose these brands in particular?
Answer: The decision to use the Apple IIe was a district-level decision, based on its ability to run Circulation Plus. The IBM and Tandy machines were added for instructional and administrative use.

Question 2: Which library management uses of microcomputers (circulation, collection development, reference support,
cataloging support, acquisitions, and serials control) have you made, with which software/hardware, and with what successes and difficulties?

**Answer:** The major use of microcomputers has been for circulation and inventory. The database also has been used in collection development/acquisition to select books for ordering. Both cataloging and acquisitions are done centrally, and computer records are downloaded.

**Question 3:** What student and teacher uses have been made (word processing, statistics, spreadsheets, games, drill for skill) in the library, with which software/hardware, and with what success or difficulties?

**Answer:** Students have made infrequent use of Appleworks and more frequent use of games and SAT study programs. Teachers assign drill for skill exercises. Teachers make use of word processing, grade programs, and lesson plan programs, most often at departmental computers. Programs used in the library include Print Shop, Library Graphics and Texas Graphics.

**Question 4:** Does the library control any administrative or curriculum uses of microcomputers? Any future plans?

**Answer:** No.

**Question 5:** Do you have any anecdotes about use, problems, or surprises you would care to share?

**Answer:** One problem is that microcomputer use requires additional space, and more microcomputer use causes demand for more microcomputers. But they are very helpful in the library and popular as well.

**Question 6:** What advice do you have for those just beginning?

**Answer:** Especially if few computers are available, use during off hours should be encouraged, and that option should be made available. It is also wise to purchase software or to purchase the privilege to use software by copyright or site license payments.

**School Number 3. Elementary (Enrollment: 800)**

**Question 1a:** What brands of microcomputers do you hold?

**Answer:** A mixture of Apple and IBM.

**Question 1b:** What procedure was used to acquire these (PTA funds, district funds, etc.)?

**Answer:** District funds were supplied to place computers in this new school in a networked system. Other sources of funds are now being considered.

**Question 1c:** Why did you choose these brands in particular?

**Answer:** The original computers were a district choice by the
Computer Services Coordinator. Currently, the district seems to be phasing Apples out, with more IBM machines being purchased.

**Question 2:** Which library management uses of microcomputers (circulation, collection development, reference support, cataloging support, acquisitions, and serials control) have you made, with which software/hardware, and with what successes and difficulties?

**Answer:** Circulation is accomplished with *Circulation Plus* on IBM. An AV module was installed on-site with help and is very useful. Collection development statistics are provided through *Circulation Plus* and are helpful for selection decisions and weeding. An electronic catalog is planned for the near future and is eagerly awaited. Cataloging is centrally done by the district.

**Question 3:** What student and teacher uses have been made (word processing, statistics, spreadsheets, games, drill for skill) in the library, with which software/hardware, and with what success or difficulties?

**Answer:** There is considerable word processing use on the network using WASATCH software, which has replaced Apple software. Additionally, teachers bring in their own software. Simulation uses are frequent, as are game playing on Apple, especially math games. Drill for skill uses are programmed by WASATCH and heavily used (math, geography, English, etc.). There has been a great increase in the use of reference materials and in reading and writing motivation traceable to available computer programs. An online encyclopedia from WASATCH is being eagerly awaited. Teachers were at first reluctant users but now are very positive, with great use of testing, grading, and progress recording on computers.

**Question 4:** Does the library control any administrative or curriculum uses of microcomputers? Any future plans?

**Answer:** No.

**Question 5:** Do you have any anecdotes about use, problems, or surprises you would care to share?

**Answer:** Several comments are worth making:

a. The kids are very fond of microcomputers, which they view as "superpersons." They attribute to computers an almost omnipotent character.

b. There is a real need for more hard drives and additional staff.

c. There is a great need to have rules about the treatment of computers. The kids are amenable to such rules. They
see the use of microcomputers as a great privilege.
d. An unfortunate surprise in setting up the library occurred when the furniture burned on the factory loading dock. Everyone was supportive and made do for a while. It was quite a sight to see 108 computers stacked in half the library space.

**Question 6:** What advice do you have for those just beginning to incorporate microcomputers?

**Answer:** It is very important to plan carefully with administration and computer people. It is also imperative to have one person available and committed to troubleshooting the equipment. And the planning should recognize that every child can use thirty minutes/day, although this is difficult to accomplish.

**Conclusion**

Judging by the data presented herein, it would seem that the decade of the nineties will bring imaginative and multifaceted use of microcomputers into public schools and public school libraries. That occurrence is an absolute necessity when one considers the preparation of students for life and work in a world which is increasingly dependent on effective and efficient use of computer technology.

**References**


Software As a Library Material in Special Libraries: A Survey and Case Study*

LAURIE E. STACKPOLE

ABSTRACT
To provide a picture of the efforts being made by special libraries to offer patron access to microcomputer software, fifty special libraries, for the most part, corporate, government, quasi-government, and military, were surveyed. Those that either circulated software or provided on-site access to it were asked how they cataloged it, provided user access to it, controlled its circulation, protected it from tampering, and prevented copying. Results are presented and discussed. A case study of the microcomputer support services provided by the Ruth H. Hooker Technical Library of the Naval Research Laboratory is presented. The library has over 450 software packages available for circulation and operates a Microcomputer Software Support Center that includes an on-site evaluation lab. The Microcomputer Software Support Center is staffed to provide product information, assistance in the identification and selection of software for specific applications, one-on-one training, and a variety of field support services such as software installation, disk recovery, and virus checking.

PART I. THE SURVEY

Introduction
Literature searches were run in Computer Database, ERIC, Information Abstracts, INSPEC, Library Literature, LISA, NTIS, and Online Chronicle. The only retrieved reference that described the

Laurie E. Stackpole, U.S. Naval Research Laboratory, Ruth H. Hooker Research Library and Technical Information Center, 4555 Overlook Avenue SW, Washington, DC 20375-5000
*This article is exempt from U.S. copyright
handling of software as a library material in a special library cited an article, written by a former staff member, describing efforts by the Ruth H. Hooker Technical Library at the Naval Research Laboratory (Rettenmaier, 1989). Even though librarians in special libraries were apparently not writing about their activities in handling software as a library material, the author was aware of some special libraries that were circulating software or making it available to users on site and suspect that there were others as well.

To test this supposition, some likely prospects were contacted to find out what they were doing. The goal was to contact about thirty libraries by telephone. To select the libraries to be contacted, use was made of personal contacts, referrals from directors of library systems and networks, and published directories of corporate and special libraries.

Identifying the Libraries

In 1988, this author presented a paper at the Special Libraries Association Annual Meeting. At that time, those attending were told that an article for *Library Trends* would be written, and the author asked those who would be able to provide some input to give her their business cards. Eight of those cards represented special libraries and those were the first people contacted.

The next set of names were three libraries, all government, that the author knew were doing something with microcomputer software. Then came the recommendations of library coordinators for the Army library program, the Army Corp of Engineers, the Air Force, and NASA. The author's own list of "likely prospects" followed which included the National Laboratories, a number of private sector research institutions, and suggestions made by colleagues.

To obtain some representation from corporate libraries in the areas of chemicals, energy, pharmaceuticals, insurance, investment, and banking, eleven libraries were selected from the SLA publication *From the Top: Profiles of U.S. and Canadian Corporate Libraries and Information Centers* (Brimsek, 1989) and seven others from *Who's Who in Special Libraries, 1989-1990*, the annual membership directory of the Special Libraries Association.

This provided an unscientific sample of fifty-nine libraries. We were successful in contacting fifty-three; however, three of those declined to participate, leaving fifty (see Appendix A). Although special libraries active in each of the fields mentioned earlier were represented, the highest concentration was scientific and engineering libraries. This bias was undoubtedly due to the way the "sample" was chosen.
The Survey Instrument

Rather than reinvent the wheel to develop a survey instrument, a survey was used on microcomputer software policies distributed to academic libraries in 1985 by the Microcomputer Software Acquisitions Policy Committee of the Association of Research Libraries. The resulting survey instrument (see Appendix B) consisted of ten questions. All libraries were contacted by telephone during December 1990 and January 1991. Various staff administered the survey. Each was provided with a script (see Appendix C) to use in explaining its purpose.

Through the survey I hoped to get information first of all about patron use of software in special libraries: what kind of access was available and to what type of software—i.e. public domain, shareware, or commercial (Questions 1 and 2). Information was also sought on whether libraries were employing any special procedures in the procurement of software that do not normally apply to books and other traditional library materials, specifically, were they obtaining site licenses or engaging in other negotiated agreements (Question 3). The next two questions dealt with how patron-use software is controlled and accessed. Was it cataloged like other material, most probably using AACR2, or was some other approach used (Question 4)? Were patrons alerted to its availability through the main catalog, specialized listings, or other techniques (Question 5)? To learn about restrictions on software that may not apply to other library materials, participants were asked about circulation policies (Question 6). Next, the issues inherent in the physical medium itself were addressed. Do libraries take any special precautions to prevent tampering with software and if so what are they (Question 7)? Do libraries take any special precautions to prevent copying of software and if so what are they (Question 8)? To provide an organizational perspective, participants were asked if anyone else in the organization was providing software support services, including lending, on-site evaluation, information about capabilities, or recommendations of software programs for particular applications (Question 9). The final question was a request for referrals to other libraries that were involved in using software as a library material (Question 10).

Results

Of the fifty libraries surveyed, twenty-one were handling software as a library material, that is, they were either circulating it to users or providing on-site access.

Of the twenty-one libraries providing patron access to software, seven were providing on-site use only; six were involved in circulation only; and eight were doing both (see Figure 1, part a). Of these twenty-
one libraries, thirteen were offering access to commercial software only, four to public domain or shareware, three to commercial as well as public domain or shareware, and one to unspecified software that was none of the three types (Figure 1, part b).

**Patron Access to Software**

Number of Libraries Surveyed = 21

![Pie charts showing software access and types](image)

Figure 1. Results of survey by type of access (a) and type of software (b)

Of the six libraries that were only circulating software, five were handling commercial software only, and one was handling public domain and shareware but no commercial software. Of the seven libraries that were providing on-site access only, four were providing such access only to commercial software, two were also providing access to public domain and shareware along with the commercial, and one library providing on-site access said it was to none of the three. Of the eight libraries that were both circulating software and providing on-site access, four were dealing with commercial software only, two were dealing with public domain only, one with public domain and shareware, and one with all three.

On the issue of site licenses or other specialized agreements, it was found that only two libraries could say for sure that they had obtained site licenses before making software available to users. One was a library that circulated software and the other a library that provided on-site use. Two other libraries were not sure whether they had site licenses. Three libraries had negotiated agreements and one library was not sure. The negotiated agreements applied to one library that provided circulation of software only, one library that provided on-site access only, and one library that offered both types of service.
Eleven libraries were found to catalog software using AACR2. Ten of these were among the fourteen libraries that circulated software. However, of these eleven libraries cataloging software using AACR2, only six said that they informed users about software availability through their main catalog.

All six of these libraries that include software in their main catalog were using AACR2, although some said "with modifications." Five of the six were libraries that circulated software. Of the six libraries that included software in their main catalog, three also made use of specialized listings; none mentioned any other alerting mechanisms. In all, nine libraries mentioned specialized listings as a way of informing users of software availability; eight of these were libraries that circulated software. Three libraries using specialized listings also used other means to inform users. Five libraries offering circulation and one library with on-site access only relied solely on other means to inform users. Among the other means mentioned were: online announcements, e-mail, electronic bulletin board systems (BBS), network announcements, closed circuit television, base or laboratory newspaper, newsletter, special announcements, advertising at the circulation desk, and in person.

Of the fourteen libraries circulating software, eleven had some type of restriction on software that did not apply to other library materials. Most often cited was a restriction on the loan period; two libraries mentioned restrictions on who could borrow software.

Of the fourteen circulating libraries, ten took some steps to protect software from tampering. Seven libraries mentioned write-protected disks, three mentioned protective packaging, four mentioned virus checking upon return, and two mentioned other means that were specified as circulating back-ups rather than originals and maintaining back-ups on a minicomputer accessible over a network as read only files. Libraries frequently used a combination of approaches. For example, only three relied exclusively on write-protected diskettes and one relied exclusively on virus checking.

Nine libraries that circulate software employed some means to protect software from duplication. Eight of these nine are libraries that circulate commercial software. The most common approach was copy protected diskettes (four libraries), followed by user agreements (three libraries). Other techniques used by one library each were warnings on the screen when the software was loaded (used by a library circulating only public domain software) and warnings on the diskettes. One library mentioned use of the vendor's copyright as a deterrent. In all but one case libraries limited themselves to a single approach to prevent duplication. The library that was the
exception to this rule utilized both copy protected diskettes and user agreements.

Of the twenty-one libraries providing some patron access to software, seventeen provided information about whether someone else in their organization was providing any of four software support services. Seven of the seventeen (about 40 percent) responding to this question said no one else was providing any services; of the ten others, five said someone else in the organization lent software for test and evaluation, four each said someone else provided information about software capabilities and made recommendations, and two said someone else was operating an on-site evaluation lab.

Of the twenty-nine libraries who were providing no patron access to software, twenty provided information about software support given by someone other than the library. Fourteen respondents (70 percent) said no one else was providing any software support. Of the six organizations where software support was being provided outside of the library, four said someone else provided information about software capabilities, four said someone else made recommendations on packages, two said that someone else was lending software, and two said someone else was operating an evaluation lab.

Discussion

As a group, libraries of the U.S. Army Corps of Engineers were most heavily involved in providing access to software. Of seven libraries contacted, four were circulating software, and one was providing on-site access. On the other hand, it was surprising to find that none of the National Laboratories contacted were involved in handling software. The same was true of many of the larger, more prestigious laboratories affiliated with corporations. It could be surmised that in larger research organizations, other components, such as computer staffs, provide software support. As a case in point, many of the larger Navy laboratories operate microcomputer support centers. These operate independently of their libraries. Some of these centers both circulate software and provide on-site access. (For example, the Naval Weapons Center in China Lake, California, has a personal computer lab that includes a software "lending library" with over 1,000 packages. On a much smaller scale, the Naval Ocean Systems Center in San Diego, California, operates a Computer Resource Center that lends some software, as does the David Taylor Ship Research and Development Center in Bethesda, Maryland.)

However the analysis of question 9 in which libraries were asked "Does someone else in your organization provide any of the following software support services...?" does not appear to support this supposition. This question was intended to elicit data on services
provided outside of the library. If that was indeed understood by
the respondents, the results are quite surprising. The analysis of replies
would show that software services outside the library existed for only
30 percent of the "no software" libraries that answered the question.
Conversely software services outside the library existed for almost
60 percent of the software-access libraries that answered the question.

There is the possibility that this question was misinterpreted
by the respondents. The interpretation could have been that the library
was the organization referred to, and that we were seeking information
on other services the library itself provides. On the other hand, if
the answers do reflect what is truly happening, it may show that
when special libraries provide access to software it is in an
environment where microcomputer use is already well supported.

When special libraries provide access to software, commercial
software is offered by most (76 percent). Less than 20 percent of
the libraries overall limit themselves to public domain software or
shareware. Most libraries apparently believe they are operating within
copyright restrictions without making any special arrangements with
publishers since only between one-fourth and one-third have entered
into site licenses or negotiated agreements with publishers. The fact
that some libraries did not know what arrangements may have been
made is not as surprising as it first appears; in many organizations
software purchases are managed by a computer support component,
which makes the arrangements before providing the software to the
library.

It was personally surprising that few libraries said they inform
users of software availability through their main catalog—fewer than
30 percent overall (35 percent if only circulating libraries are
considered). This is particularly puzzling because more than half
the libraries catalog software using AACR2; a figure that rises to
more than 70 percent for the circulating libraries.

Although few libraries mentioned restrictions on who could
borrow software, it is suspected that most limit all circulation to
employees of the organization and consequently did not see that as
a special restriction on software loans. One library mentioned that
only technical center staff could borrow software and another said
circulation was restricted to project managers. Various loan periods
were mentioned, the most common being two weeks.

Of the libraries that lend software, over 70 percent make some
attempt to prevent tampering. The exclusive dependence of a small
number of libraries (21 percent) on write-protected diskettes or on
write-protected diskettes in combination with protective packaging
(28 percent) to prevent tampering is worth commenting on. Since
write-protect tabs can often be easily removed, this is a protection
only against inadvertent alterations to the disk; it does little to prevent deliberate tampering. Protective packaging, although mentioned by three libraries, was always used in combination with some other approach—either with write-protected diskettes (one library) or with virus checking (two libraries). In and of itself, protective packaging only serves to prevent inadvertent physical damage to the disks; it does not protect the software itself from damage or alteration or, even more critical, infection by viruses. The few libraries performing any type of virus checking (three) is disturbing but understandable. Adding the requirement to check each package after circulation certainly complicates the process. However, one good virus scare could put the library in a very unfavorable position and put an end to its software circulation efforts permanently.

Of those libraries circulating commercial software (ten), only two apparently make no effort whatsoever to prevent copying. The techniques used by libraries run the gamut from making it physically difficult to copy to simply putting the user on notice that copying is prohibited. User agreements and notices on diskettes or on the screen are variants of the latter approach as is dependence upon the vendor’s notice of copyright. Half the libraries circulating commercial software used at least one of these approaches. However, it was somewhat surprising that more libraries were not labeling software with a copyright notice in anticipation of the Computer Software Rental Amendments Act of 1990, enacted December 1, 1990. This law amends Section 109(b) of the Copyright Act to prohibit the commercial rental, lease, or lending of computer software (Raysman & Brown, 1990). An exemption permits the lending of a computer program for nonprofit purposes by a nonprofit library, but requires libraries lending software to affix to each software package a notice of copyright, which will be specified by the Register of Copyrights. During the drafting of this legislation, one proposal for wording of this notice read: “Warning: This computer program is protected under the copyright law. Making a copy of this program without permission of the copyright owner is prohibited. Anyone copying this program without permission of the copyright owner may be subject to payment of up to $100,000 damages and, in some cases, imprisonment for up to one year.”

Summary

Of those special libraries found to be circulating software or providing on-site access for patrons, most were handling commercial software, although few had entered into on-site license or other agreements with publishers. For the most part, libraries rely on means other than the main catalog to alert users to the availability of this
material, although the majority of libraries that circulate software do catalog it. Circulation policies often limit the length of time that software can be charged out and may also restrict who may borrow it. Most libraries try to protect software that they circulate from tampering. Libraries circulating commercial software were found on the whole to be making efforts to protect it from copying.

PART 2. THE CASE STUDY

Introduction

The Ruth H. Hooker Technical Library is a scientific research library that serves the researchers and administrators of the Naval Research Laboratory (NRL). The laboratory has about 3,000 employees with about half actively engaged in research. About 1,000 on-site contractors are also engaged in the research effort. NRL occupies a 130 acre campus of 152 buildings located on the Potomac River in southwest Washington, D.C. The research efforts of the laboratory are concentrated in seven broad areas: acoustics, advanced space sensing, artificial intelligence, astrophysics, biotechnology, chemistry, condensed matter science, information technology, materials research, optical sciences, plasma physics, radar and electronics, radiation technology, remote sensing, space science, space systems, and structural dynamics.

For over sixty years the library has served as a focal point for meeting the information needs of the laboratory. Contributing to the library's success as an information provider is an excellent research collection of books, journals, and reports, selected for relevancy to the NRL mission and interest areas. To provide users with intellectual and physical access to these holdings, emphasis has been placed on the creation of tools such as indexes and catalogs, now largely automated, and the establishment of an environment that encourages users to frequent the stacks and provides facilities for in-house use and the ability to borrow many materials. Over the last two decades, online subject and mission-oriented databases (some now available in-house on CD-ROM) have become increasingly useful in helping investigators search the entire universe of information to identify sources relevant to their inquiries, and participation in a worldwide bibliographic network (OCLC) allows the library to locate and request such sources from other libraries electronically.

During its first sixty years, the library dealt primarily with print media, language tapes being the single exception. However, in 1987, the library began to consider adding microcomputer software to the types of material with which it deals. The impetus for expanding library collection and services into the microcomputer software area
was a proposal by an NRL researcher to the laboratory's Computer Policy Panel, which recommended that the library purchase software for employees just as it purchases books and journals. Although such expanded procurement authority was not granted, once the library's role in supporting laboratory software needs was addressed, several avenues for improving software availability and facilitating its implementation and use became evident. The first of these to be pursued was a software lending program paralleling the circulation of bibliographic materials. A concurrent effort was the expansion of reference services to assist users in the identification and selection of microcomputer software for particular types of applications. After a period of planning and implementation, the library opened a fully equipped and staffed Microcomputer Software Support Center that currently provides software information, evaluations, and selection advice; offers hands-on experience and one-on-one instruction in the use of software; and assists users in solving installation, compatibility, and virus problems.

Software Circulation

In July 1988, the Ruth H. Hooker Technical Library of the Naval Research Laboratory first added commercial software packages to the materials it lends to laboratory staff, starting with ten of the most popular programs for IBM-compatible computers. This was a point of departure for the library in meeting laboratory information needs arising from the increasing use of microcomputers for both office and laboratory applications. Getting software into the hands of the users so that they could test and evaluate it on their own machines was a major step beyond earlier library efforts to provide staff with information about software through the purchase of relevant materials and searches of computerized databases covering the computer field.

Steps to Discourage Software "Piracy." Underlying the circulation of software are a number of carefully worked out controls and procedures to assure that the rights of the software publisher are properly observed. The library worked with the NRL Counsel to develop these procedures. To ensure that all users understand that the purpose of the lending program is to provide software for test and evaluation only, users are asked to register as software borrowers by signing an agreement. This agreement states that they will not make nor allow others to make copies, and that while the software may be copied to a hard disk for test and evaluation, any such copy will be erased before the package is returned to the library (see Figure 2). Only users who have signed this agreement are entered into the
library’s computer system as authorized software borrowers.

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Telephone</th>
</tr>
</thead>
</table>

**AGREEMENT FOR BORROWING COMMERCIAL SOFTWARE FROM THE NRL LIBRARY**

I understand that U.S. Copyright Law prohibits the unauthorized copying of copyrighted software. In borrowing such software from the Library I agree to observe the prohibition against copying:

1. I will not copy software to another diskette;
2. If software is copied to a hard disk for test or evaluation, I will erase the copy before returning the software to the Library;
3. I will control access to the software so that illicit copying by others does not occur.

I understand I may be asked to sign a statement upon the return of the software to the Library verifying that no copies made by me, or by others while the software was charged out to me, are in existence.

Signature  
Date

Figure 2. Agreement card to register as a software borrower

As a psychological deterrent to copying, originals with the vendor’s notice of copyright are circulated rather than copies. The back-up copy permitted under copyright law is retained in a secure area in the library and is used only if the circulating copy is in some way damaged.

To be sure that users are continually kept aware of the fact that they are dealing with copyrighted material, each disk is labeled with information about copyright restrictions (see Figure 3). Furthermore, upon returning the software to the library, each user must verify in writing that no other copy exists (see Figure 4). This verification is made on a card that is specific to the software that has been used; these cards, with the signatures of the various borrowers, are retained permanently. Should a question later arise about the illegal use of software from the library’s lending collection, responsibility can be traced to the user.

*Keeping Software Intact.* To provide the user with assurance that the software is complete and virus free, after each circulation the software is checked for viruses using antiviral programs that check for specific viruses as well as for changes in the disk. As the computer used for checking has no hard disk, it cannot itself become infected. If software is found to be altered in any way, which has happened
Figure 3. Notice of copyright label for software diskettes

Figure 4. Certification that software has not been copied
a few times, the users are alerted to the fact that a virus may be lurking in their computer. The contaminated copy is repaired before circulation to the next user.

When a software package first arrives in the library, a "spec sheet" is prepared (see Figure 5). Each spec sheet provides, at a minimum, a brief description of the software, usually extracted from the manual, a complete list of the contents of each package, and the system specifications necessary to run the software. In addition, a spec sheet may present a list of key features or, in the case of a software upgrade, outline the differences between the new version and the previous version. Upon its return to the library, each package, which often comprises more than twenty individual items, is checked against the spec sheet contents list to be sure it is complete. The user is not relieved of responsibility for the software until all parts are returned, nor is the software made available to the next user until it is complete.

One of the problems encountered in circulating software is that the packaging is not always very sturdy. After several uses, we frequently wound up with packages that were held together so insecurely with tape and rubber bands that we were afraid users would lose pieces en route. The first approach to solving this problem was to buy a number of throw-away plastic bags imprinted with the official library symbol. These were easy to store and served the purpose for all but the most bulky packages. Later, at the suggestion of one of our staff, we looked into the purchase of reusable canvas bags. These could be ordered in a size large enough to accommodate all software and could be imprinted with the library's logo and wording of choice. An in-library contest was held to come up with a slogan for these bags. The winner was "Research...It's in the Bag." We purchased 100 bags, 13 × 12 × 4, in navy blue canvas; these are stamped on one side in white with the logo—an owl sitting on an anchor and looking through a microscope—with the slogan in a semi-circle above, and "NRL Technical Library" below. Bags are bar coded and checked out to users along with their software. They have an added value beyond their utility for protecting software in transit; as people carry them about, they serve as walking advertisements for the library.

Circulation Policies. When the library first began to circulate software, only NRL employees were authorized as borrowers. However, since the library circulates books and other materials to on-site contractors, this restriction met with a certain amount of resistance, both from the contract staff and from the NRL researchers and administrators who rely upon ongoing contractor support in conducting the laboratory's research program. It soon became evident that researchers were working around the restriction on lending
Oracle for Macintosh

Oracle for Macintosh v1.1 by Oracle 26 Jan 90

"Oracle for Macintosh is a relational database management system. This software features multi-user support, optimization techniques, array interfaces, transaction processing and many SQL programming tools".

Contents:
Oracle for Mac References
Oracle for Mac Error Codes
Oracle for Mac Primers
Oracle for Mac Getting Started
Oracle for Mac Stacks
Oracle for Mac System Release Bulletin
Program Disks #1-3........................................3.5"
Database File Disk #4....................................3.5"
Related Files Disk #5....................................3.5"
Stacks Disks #6-7........................................3.5"

System Requirements:
Macintosh SE/SE30, Macintosh II, or IIx
2 megabytes of internal memory
A hard disk with at least 5 megabytes of disk space available
System 6.0 or later
Finder 6.1 or later
Hypercard version 1.2

Key Features:
SQL PLUS
Pro*C
Hypertalk
Oracle runs from within Hypercard

software to contractors; authorized borrowers were checking out software and then turning it over to contract staff to test and evaluate. Since this practice meant that the employee who had accepted responsibility was not in full control of the software and the library had no record of who actually had it, it was decided, in the best interests of all, to extend software access to on-site contractors. The General Counsel determined that this presented no legal problem, so about a year into the program, that change was made.

Unlike books or other library materials which can be returned by internal mail or by a secretary or colleague, software must be returned in person by the borrower; upon return of the software, the borrower is required to certify in writing that no other copies of the software are in existence. Because scientists here are busy people and many of them are frequent travelers, this is, to say the least,
not a popular policy. So that people will know up front that returning the software in person is an absolute requirement, we include this information as part of the initial user agreement. However, we have had to remind people from time to time and on more than one occasion, a library staff member has had to ask someone to come to the library to provide the required signature.

Although it is not essential that software that is to be checked out be picked up in person by the borrower, it is the library's policy not to charge out software indiscriminately in someone else's name. In other words, if a user has called and requested a package or has been notified that previously requested software is available, the user can ask a secretary or a colleague to pick it up. However, if someone selects a package and then tells us it is for someone else, we do not charge it to the absent party without expressed consent. In other words, the library will not allocate responsibility for software to someone who may be unaware that this is happening.

The loan period for software is two weeks with one renewal permitted if there is no waiting list. Renewals may be made by phone. The loan period for books is one month with two renewals, except for materials with a waiting list and then it is two weeks with no renewals. The two-week loan period for software was arrived at somewhat arbitrarily; we were striving for a balance between the time required to test and evaluate the software and the objective of making each package available to as many people as possible. For those who have the software in their hands, we are often told that two weeks is incredibly short; for those who are waiting for the software, and waiting lists are sometimes quite long, we are often told two weeks is too long. In estimating how long a person may have to wait for a package to become available, we add several days to the two week loan period. Not everyone returns material promptly. In such cases, we telephone users immediately and remind them that the software is due. With good luck this gets the package back to the library within one or two days. If the contents are complete and the virus check goes well, the package will be ready to go out again within one or two days. Since it has to be picked up in person, we telephone the next user, say it is available, and allow three days, counting the day of the call, for pick-up. The two weeks start only when the software is in the hands of the user. If the person at the top of the waiting list is not available or declines the software, that name drops down to the number two position on the list and the person who was next in line rises to the top. If on the other hand the prospective borrower simply fails to pick up the software, that name drops to the bottom of the waiting list.
User Assessment. About six months into the program, all registered software borrowers were surveyed regarding satisfaction with the lending program. Eighty users responded to this survey; forty-nine rated the program as excellent, thirty as satisfactory, and one as poor (the one poor rating was by a user who had not yet received a popular program for which he had been waiting for some time). Fifty-six believed the capability to “try before you buy” had saved them money. All recommended that the library continue the program. A large

--

From March 1989 Survey

WHAT THE USERS SAY

Extremely useful in evaluating prospective purchases of software. Keep up the good work!

Has allowed me to decide whether to buy a program or which program is best. This is an excellent service!

It kept us from buying software that wasn’t what we wanted.

So far, very useful - opportunity to try out some of the current software.

Replaces "traditional" practice of stealing undocumented software and therefore provides better assessment of value.

Can get beyond the hype and see actual professional performance of software.

Actual software certainly more effective evaluation than demo disk. Did not have to listen to sales pitch. Saved time.

The program provides a broader understanding of what a computer can do for you.

Probably more useful to the majority of laboratory’s personnel than many book purchases.

Figure 6. Typical responses to user survey on software lending
number of respondents included comments on specific ways they had benefited from the program. Many were variations on the theme that by testing and evaluating software they had avoided making inappropriate purchases (see Figure 6).

At the end of 1990, 753 users were registered as software borrowers. Circulation (check-outs) during the last half of the year was averaging 136 per month with a high of 213 during August and a low of 116 during December.

**Announcing Software Availability**

Making software available is only part of the equation; the other part is letting users know what software is available.

**Access through the Library’s Automated Catalog.** All software is cataloged using a simplified version of the MARC Computer File Format and AACR2. We use OCLC to create a catalog record, which is downloaded into the library’s automated system (LS/2000); we do not, however, add software records to the OCLC databases, as the cataloging is nonstandard and the software is not available for interlibrary loan. An OCLC record, modified to meet NRL specifications, is shown in Figure 7. The title, usually as shown on the disk(s), is always selected as the Main Entry (245 field). If there are variants of the title, including spelling as one word or two, they are entered into the 740 field, which is searchable.

![Screen 1 of 2](image1)

**NO HOLDINGS IN NRL - FOR HOLDINGS ENTER dh DEPRESS DISPLAY RECD SEND**

<table>
<thead>
<tr>
<th>OCLC: 22191901</th>
<th>Rec stat: n</th>
<th>Entrd: 900807</th>
<th>Used: 910123</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type: m Bib l1: m Govt pub:</td>
<td>Lang: N/A Source: d Frequn: n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>File: b Enc l1: I Machine:</td>
<td>Ctry: cau Dat tp: s Regusr:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desc: a Mod rec: Audience: Dates: 1990,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 010</td>
<td>2 040</td>
<td>3 090</td>
<td>4 049</td>
</tr>
<tr>
<td>5 245 00</td>
<td>6 250</td>
<td>7 260</td>
<td>9 505 0</td>
</tr>
<tr>
<td>8 300</td>
<td>9 505 0</td>
<td>10 650</td>
<td>11 650</td>
</tr>
<tr>
<td>5 computer disks + e 2 manuals (loose-leaf in one binder in box)</td>
<td>[manual] -- Autograph overnight slide service (1 sheet) -- Harvard graphics accessories (flyer) -- 5 computer disks at 3 1/2 in.</td>
<td>Computer software.</td>
<td>Computer graphics x Computer programs.</td>
</tr>
<tr>
<td>12 650</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Screen 2 of 2**

| 13 710 20 | Software Publishing Corporation. |

**Figure 7. OCLC Cataloging Record Modified to NRL specifications for software**

Although we use LC call numbers for book holdings, we devised a custom call number system for software, which is maintained
separately from the rest of the collection but is organized for ease of access. All software is given a call number that starts “SOF.” The next part of the call number designates the operating system, either “IBM” for DOS software or “MAC” for Apple Macintosh software. A Cutter number is created based on the title established by the cataloger as the main entry. The version or release of the software forms the final part of the call number. For example, the call number for Version 4.0 of Microsoft Word is SOF IBM .M586 v. 4.0. This system keeps all software together, grouped by operating system, and sequenced by title and version.

Specialized Catalogs, Announcements, and Other Alerting Mechanisms. Printed catalogs listing software in the lending collection are issued periodically, made available within the library, and widely distributed throughout the laboratory (see part a of Figure 8). The most recent catalog presented an alphabetical listing of all available packages with a brief description (see part b of Figure 8) and also listed software by operating system and application (see parts c and d of Figure 8).

New software available for loan is also listed in the Library Accession List, which is issued once or twice a week. This list, which is distributed to all NRL staff who have asked to receive it, also serves as a request form when signed and returned to the library with requested items marked.

Articles highlighting new software purchases are frequently published in the library newsletter, issued roughly every other month, and in the bi-weekly laboratory newspaper, Labstracts. Starting in January 1991, the library’s Microcomputer Software Support Center began to issue its own monthly newsletter and established a topic on the laboratory BBS. Both list new software acquisitions.

To highlight the availability of software for borrowing, software packages are located in four lockable glass-front cabinets in the front of the library near the circulation desk. All software that is available for check-out can be immediately seen by prospective borrowers. These cabinets, which are directly opposite the reference area and within easy view of the circulation desk, are left unlocked during the day so that users can remove packages from the cabinet and look at the accompanying manuals and descriptive material. Notebooks containing the spec sheets describing each software program and the equipment necessary to run it are located near the cabinets. The cabinets themselves were custom built to our specifications. They have a depth of 15.5 inches, 3.5 inches deeper than the glass front bookcases or display cabinets usually found in library and office catalogs. This greater depth is needed to allow even oversized software,
which may be accompanied by looseleaf notebooks, to be shelved like a book with the “spine” facing outward. After a period of experimenting with shelving software by title, we decided instead to shelve by call number. Shelving by title led to a good bit of confusion both for the shelve and the user—e.g., is it Word or is it Microsoft Word? Now a quick catalog query tells us immediately.

The Software Collection

A basic decision in developing a software collection is what kind of equipment will be supported. Because library experience was exclusively with IBM-compatible equipment and that seemed to be the most popular microcomputing environment throughout the lab, we decided to concentrate initial efforts there. Consequently, for the first nine months, we purchased and circulated only DOS packages,
although from the beginning we intended to expand the program to include Macintosh software. There was the not-unexpected criticism that we were neglecting the sizable community of Macintosh users. An analysis of computer purchases performed in October 1989 showed that the NRL owned 2,794 microcomputers of which 1,801 were IBM compatible and 866 were Apple computers including Macintoshes; these numbers would be substantially higher today. One delay in providing access to the Macintosh software was that we needed to purchase equipment to perform the disk backups and virus checking. Once that was accomplished, we began to build the collection of Macintosh software and circulated the first Mac programs in May 1989. Today there are 330 packages for IBM-compatible computers and 130 for Macintosh computers, which reflects relative
availability of relevant software for the two systems. We are considering expanding the program to include UNIX-based systems which appear to be proliferating at the laboratory.

**Software Selection.** In the beginning, the software purchased for circulation was the more popular office automation types of programs—word processing, spreadsheets, graphics, and database programs. It quickly became evident that NRL users were perhaps even more interested in having scientific software available for evaluation as well. Model simulation, mathematics solvers, neural networks, optical design, pattern recognition, and signal processing programs were soon added. About 20 percent of the collection is now comprised of scientific software.

Recommendations by users continue to form the basis of what is bought. Programs that are highly publicized and presented as "hot" in the computer literature are also likely prospects. Obviously we cannot buy every program that comes along, so if we have, say, a number of graphics programs, the next one bought will have to have some special capability. We have made a few mistakes and bought things that we thought the scientists would be excited about and then found that they weren't all that interested. As a result, the general rule is wait until someone suggests it; we have found the NRL researchers are not shy about making recommendations.

**Adding Second Copies.** Initially, only one copy of each software package is purchased. When the waiting list for that package is longer than five users, we consider the purchase of a second and perhaps third package. However, purchase of multiple copies is not automatic; our experience is that after the first flush of activity, interest dies down, and second and third copies frequently languish on the shelf. The decision to buy more copies is a balancing act between the cost of the package, which averages $400, and the urgency with which users are expressing their frustration over waiting. One way this problem is addressed is by purchasing second copies of highly popular programs for reference use. That way there is always a copy available that the user can look at on-site if the delay becomes intolerable. Reference software is housed in the library’s Microcomputer Software Support Center, which is described later. Also included in the reference collection are demonstration packages and review copies that have been provided by publishers.

**New Versions or Releases.** Unlike books, where new editions are relatively infrequent, software is characterized by the continuous announcement of new versions or releases. Keeping even a moderate
size software collection up to date is a major effort. For major revisions of major packages, like *WordPerfect*, where the release of an update gets high visibility, there is no problem in making the latest version available to users. However, in many cases, it is only by religiously reviewing the computer literature that we find out what software is being upgraded. Users often help by requesting us to order upgrades they find out about before we do. Periodically we check the collection against published software lists to be sure we have the current version. In some cases an upgrade may only be some additions or alterations to an existing package; in others it is a complete replacement. When the entire package is replaced, we generally retain the older version as a reference copy. For packages like Lotus 1-2-3 or Microsoft Word, where the vendor continues to offer more than one version, both versions may be retained as circulation copies. In the rare case where a package is not being used, we of course do not update.

**Public Domain Software in the Reference Collection.** Only commercial software is circulated. We do, however, collect public domain software for both the IBM and the Macintosh and make it available for downloading in the Microcomputer Software Support Center. For example, there are CD-ROMs of both IBM and Mac software: the PC-SIG Library of public domain software for IBM compatibles and the Apple Science CD for Macintoshes, which is issued by Apple and contains the National Council for Supercomputing Applications (NCSA) public domain software. We have recently started making available public domain software downloaded from bulletin boards (and virus checked) and are looking at the purchase of other compilations of public domain software. Users are asked to provide their own disks for downloading.

**Site Licenses and Bulk Purchases.** With a view to providing users with retention copies of commercial software for permanent use, we have explored the feasibility of obtaining site licenses for popular software programs and of the alternative of purchasing multiple copies at substantial discount. While site licensing appears on the surface to provide the greater savings, upon closer investigation it is found to place substantial demands upon internal resources, which would incur their own costs in terms of staff, equipment, and space. The purchase of multiple copies, on the other hand, can cut the purchase price by as much as half, reduce the time spent in preparing and processing procurement requests, and speed delivery, with much less effort on the part of the organization. A common scheme for site licensing is for a software manufacturer to provide the procuring organization with one master copy of both the software and the
documentation; reproducing both software and documentation and getting it to the end-user becomes the responsibility of the purchaser. In a variation of this plan, some companies provide one set of program disks and one set of documentation for every five or ten users. We concluded that handling even one 1,000-copy site license under either of these plans would overwhelm our resources. Savings of up to 75 percent are available under a site license providing that the number of users approaches the maximum allowed under the agreement, say 1,000 users. If the usage is 500 instead of 1,000, then savings drop to 50 percent. If usage exceeds 1,000 users, the procuring organization is usually obliged to pay an additional fee, requiring that records be kept of the distribution of software and documentation. Before embarking on this approach, some basic issues need to be addressed. For example, how will the organization fund site licenses; will the library's budget be increased to provide central funding or will users be charged for availing themselves of the site license? In the latter case, how should costs be allocated since the total number of users is unknown and generally increases over the life of the site license?

At this point, the only bulk purchases made have been upgrades from WordPerfect 5.0 to 5.1. We ordered ninety-eight copies of 5.1 for users already licensed to run the earlier version. This particular effort did not result in a great monetary saving because the cost of the upgrade was so low, but it did save time and effort by consolidating many individual purchases into two large ones. We are about to offer a similar upgrade to Microsoft Windows 3.0 to the NRL community. Such purchases are relatively easy for the library to handle. As part of its acquisition function, the library purchases all books and journals required by NRL staff for use in their work. We therefore have mechanisms in place that allow users to request the library to purchase materials and enable the library to charge the user for the costs incurred. Although procurement authority does not extend to software, which must be ordered through the laboratory's supply division, these same mechanisms can be utilized. The difference is that instead of issuing a purchase order for software, we prepare a purchase request for supply to prepare the purchase order.

The Microcomputer Software Support Center

The lending of software was an important, but only a first, step in assisting users to achieve the often elusive goal of enhanced productivity through the use of microcomputers. Although library reference staff were conversant in using existing catalogs and manuals and in searching online databases for software information, users appeared to need to interact with someone who had extensive microcomputer experience and who could serve as an advisor or
software "guru." In October 1988, the library took advantage of an existing laboratory contract to bring such a person on board to serve as the principal contact for users requiring software information and to participate in the planning for future support services.

Providing a one-stop location where users could get information about and assistance in using software was an integral part of the library's overall plan, but space limitations initially made this seem a distant goal. However, about the time we began to lend software in the summer of 1988, a computer room, located within the library but "owned and operated" by another part of the laboratory, became available. This room proved to be quite suitable for a microcomputer center. It measures $36 \times 26$ feet, has a raised floor, and is only steps from the circulation desk and reference area. With a place to put a microcomputer center, the library and its contractor staffing began to design a facility, order equipment and furnishings, and plan for services.

The center opened for business with a ribbon cutting by the NRL commanding officer on September 7, 1989. The new center offered IBM-compatible and Macintosh workstations for on-site use of software, a CD-ROM user station for information searches and downloading of public domain software, a video station with software tutorials for individual or group use, a microcomputer for searching in-house databases, and IBM and Macintosh virus-checking stations. Staff dedicated to center activities and support of the lending program had now grown to three: a manager, a program administrator, and a field technician, plus a summer student for data entry and clerical support. A few months later, as workloads increased, an additional person was added to serve as the primary user contact for advice and training; later a full-time person was hired for routine operations such as scanning and clerical support. Staff has remained at this level for the past year; five people seem able to support the current functions of the microcomputer center.

Information Services. The Microcomputer Support Center is organizationally and functionally an extension of reference services. Just as reference librarians assist researchers in identifying and selecting books, articles, and reports to satisfy specific information inquiries, the systems analysts who staff the microcomputer center assist users in identifying and selecting the microcomputer software that best meets user requirements. Research tools in the form of CD-ROM and online databases play a key role in enabling center staff to respond to inquiries. All staff function as information professionals and view this as a principal duty, although each have other projects and assignments.
One of the first specialized research tools we introduced to provide users with microcomputer information was a CD-ROM product, which indexes over 100 computer publications and provides full text of the contents of some major magazines. This product can be searched by end-users or by staff for rapid responses to inquiries about particular software packages or types of products. In addition to descriptions of particular programs, evaluative articles that compare and rate packages with a similar purpose can be quickly located to assist in selection. For the convenience of users, the latest issues of the more popular microcomputer periodicals are shelved in the center; older issues are retained in the library stacks.

CD-ROM technology has proven so economical and useful for satisfying information queries that a second CD-ROM product, which includes technology overviews, product reviews, vendor announcements, specifications, and pricing will soon be added.

To meet the need for information about scientific software, an in-house database, called the Scientific Software Database, was created. To lay the foundation for this database, various catalogs and directories were searched, and commercial vendors, government facilities, universities, and laboratories were contacted for current information on scientific software they had developed. The database indexes and, in many cases, abstracts the information content of about 1,500 vendor brochures. The brochures themselves are all on file and can be retrieved by a database search. Future versions of this database will include scanned images of the brochures themselves.

An additional information source in the form of newsletters issued by computer user groups, software manufacturers, and industry associations was introduced to help users stay abreast of the software field. This information complements the more formal publications that have traditionally been part of the library collection.

The center was planned as a one-stop facility to address all facets of microcomputer software support for NRL. In addition to providing a cadre of in-house consultants supported by the above-mentioned information tools, it facilitates microcomputer use at NRL by offering: a user evaluation lab where users can try out software and test new equipment; vendor demonstrations and expos for previewing microcomputer products and capabilities; and field support for solving a wide range of software-related problems, including disk recovery and virus checking.

The User Evaluation Lab. The User Evaluation Lab gives users the opportunity to "test drive" software that their own computers might not be equipped to run, and to evaluate the usefulness of a variety of add-ons and peripherals. Fully-equipped IBM-compatible and
Macintosh computers permit users to try out a wide range of software and many types of hardware add-ons. Computers have upgraded memory, graphics, and accelerator boards, and large screen monitors. Peripherals available include color and laser printers, optical storage devices, and scanners. Short-term leases of new computers have enabled the center to give NRL staff hands-on experience with the latest state-of-the-art technology providing users a "try-before-you-buy" opportunity. Systems that have been resident recently include a PS/2 model 70, a 486-based IBM-compatible, a Macintosh II fx, and an Amiga 2500 with AmigaVision, a program for creating presentations, tours, tutorials, and self-running demos.

To help users evaluate the portable computer market, the center purchased five portable computers, each by a different manufacturer. Four were DOS-based and the fifth a Macintosh. These computers are available for evaluation on site or can be checked out for travel, for work at home, or to take to presentations and briefings. User response to this program has been high, particularly in borrowing smaller lighter computers (one weighs only eight pounds). A second Macintosh portable is on order.

One application that users can test out in the User Evaluation Lab is the optical scanning of library materials for electronic storage and retrieval. Two scanners are available: a greyscale scanner connected to a 386 machine running Windows 3.0 and a color/greyscale scanner connected to an Apple Macintosh IIx computer with an accelerator board. Appropriate software enables both to be used for Optical Character Recognition (OCR) and image scanning. Users are encouraged to explore optical scanning as an alternative to making a single photocopy for personal use of portions of journals, books, or reference materials.

Although training, in the sense of providing formal classroom instruction, is not part of the center's charter, staff do a lot of hand holding and individualized instruction to get people started in using new software programs and equipment. The combination of expert staff and a User Evaluation Lab creates an environment that encourages users to ask questions and staff to provide one-on-one training. The instruction is informal, often unscheduled, and runs the gamut from helping someone get started with a particular package to sitting down with them and demonstrating how to use key features.

Field Support Services. As important as it is to help people decide what software they want, to give them a chance to try it out, to help them specify their systems, and to show them how it all works together, there still remains a final hurdle: what happens when the software and the system come together in the office or laboratory
and for some reason do not work correctly? In response to the obvious needs of the user community for assistance in this area, the microcomputer center provides field support for both IBM and Macintosh systems. A great deal of problem-solving occurs over the telephone, but there are times when only a "house call" will suffice.

In addition to resolving compatibility issues and identifying configuration problems that may keep new software from running properly, field support responds to distress calls that range from deleted files to hard disk crashes. In late 1989 when rumors of viruses were prevalent, field support staff helped NRL researchers and administrative staff remain confident by scanning systems and removing suspected viruses. A flyer sent out at that time told users, "whether it's a major infection or just a common cold, the Software Support Center's PC Doctor will help your computer make a quick recovery."

In the course of helping users solve their problems, field support staff may identify a culprit that is both pervasive and pernicious. A case in point was a number of system crashes that occurred in close succession throughout the laboratory, always involving one particular brand of floppy disk. A notice was published in the laboratory newspaper alerting users to the problem and urging them to back up their data on other brands of floppies.

**Showcasing Microcomputer Products.** One of the major ways people find out about the "latest and greatest" in computing is by attending shows and expos. Soon after its opening, the center hosted its first major vendor demonstration. Billed as ScannerFest '89, it was held in the laboratory's Exhibit Room and featured data input devices and software from twenty-six vendors, thirteen on each of the two days. Over 550 people attended this event.

In the spring of 1990, the center held a Presentation Graphics Expo. Forty vendors, twenty each day, participated. In addition to software, input and output devices, including film recorders and color printers, were featured along with workstations for engineering and modeling applications. Attendance for this expo was estimated at 900.

On the average of twice a month, the Software Center hosts demonstrations of software products or computer systems. During the past six months, vendors have demonstrated twelve products including scientific software, programming software, page layout software, graphics software, spreadsheet software, accelerator add-on cards, portable computers, new computer product lines, and video software for computer presentations.

The first anniversary of the center, in September 1990, was
celebrated with an open house and day-long demonstrations of three software products by vendors. In December 1990, a Windows 3.0 show, with ten vendors, attracted about 250 people.

During the past few months, the microcomputer center has formed an NRL Macintosh Users Group, which currently has 110 members. As coordinator of this group, the center recently hosted a day-long seminar on the capabilities of Macintosh's new System 7. About 150 attended this program. The center has been selected to beta test this new system, permitting the NRL community to be among the first to preview it.

**Summary**

By expanding its role to provide access to microcomputer software and support the use of microcomputers, the Ruth H. Hooker Technical Library has taken an active role in alleviating some of the frustrations encountered by NRL researchers, administrators, and support staff as they strive for the often elusive goal of enhanced productivity through the use of microcomputers. Library services include: providing information about software and hardware; lending software for test and evaluation; operating a user evaluation lab; showcasing microcomputer products; complementing formal training programs; and performing in-office troubleshooting. To perform this wide range of functions, the library augmented its staff with a contract-operated Microcomputer Software Support Center, operated as an extension of the library's reference services.

Although the Microcomputer Software Support Center sometimes seems like the tail wagging the dog, its establishment and the services it provides have been helpful to the library as well as to the NRL community. It has provided, and is continuing to provide, the library with increased visibility throughout the laboratory and the broader Navy community. One positive result is that the library is recognized as an innovator—aware of technology and supportive in helping people use it. This appears to be working to the library's advantage with greater involvement in planning for laboratory computer and communications resources, such as the installation of a fiber optic network, and high-level interest in and support for expanding existing library computer resources. Such expansion efforts include: an optical disk system, already installed, for storing the entire collection of reports (over 100,000 paper copies totaling 6.5 million pages); procurement of a host computer (which was delivered in April 1991) and software for providing access to internally developed and perhaps leased databases; and the planned replacement of the current automated library system for one that will provide enhanced capabilities in the areas of information retrieval, database access, electronic storage, document delivery, and networking.
APPENDIX A

Libraries Surveyed on the Handling of Software as a Library Material

Aetna Life & Casualty—Corporate Information Center
Alberta and Southern Gas Company, Ltd.—Information Center
American Bankers Association—Library
American Cyanamid Company—Agricultural Research Division—Technical Information Services
American Express—Travelers Cheque Operating Center—Systems Library
AT&T Bell Laboratories—Library Network
Bank of America—Research Library
Chevron Corporation—Corporate Library
Dow Chemical Company—Technical Information Services
Charles Stark Draper Laboratory, Inc.—Technical Information Center
E.I. du Pont de Nemours—Technical Library Network
Fermi National Accelerator Laboratory—Library
General Electric Company—Corporate R & D—Whitney Information Services
General Motors Corporation—Research Laboratories Library
IBM—Thomas J. Watson Research Center—Library
Johns Hopkins University Applied Physics Laboratory—R.E. Gibson Library and Information Center
Lawrence Berkeley Laboratory—Library
Lawrence Livermore National Laboratory—Technical Information Department
Los Alamos National Laboratory—Library
Martin Marietta Energy Systems, Inc.—Libraries
Mitre Corporation—Library
National Center for Atmospheric Research—Library
National Institute of Standards and Technology—Research and Information Center
National Oceanic and Atmospheric Administration—Mountain Administrative Support Center—Library
Phillips Petroleum Company—R & D Library
Price Waterhouse—National Information Center
Sandia National Laboratories—Technical Library
Space Telescope Science Institute (NASA)—Library
Towers, Perrin, Forster & Crosby, Inc.—Corporate Information Center
Travelers Insurance Company—Corporate Library
TRW Defense Systems Group—Technical Information Center
Union Carbide Corporation—Library & Technical Information Service
U.S. Air Force—Eglin Air Force Base—Library Branch
U.S. Air Force—Lackland Air Force Base—Base Library
U.S. Army—Armament Research, Development & Engineering Center—Scientific and Technical Information Division
U.S. Army—Fort Campbell—Post Library
U.S. Army—Information Systems Selection and Acquisitions Agency—Library
U.S. Army—Missile Command & Marshall Space Flight Center—Technical Library
APPENDIX A (Cont.)

Libraries Surveyed on the Handling of Software as a Library Material

U.S. Army—Pentagon Library
U.S. Army Corps of Engineers—Buffalo District—Technical Library
U.S. Army Corps of Engineers—Construction Engineering Research Laboratory—H.B. Zackrison Memorial Library
U.S. Army Corps of Engineers—Huntington District—Library
U.S. Army Corps of Engineers—Louisville District—Library
U.S. Army Corps of Engineers—Mobile District—Technical Library
U.S. Army Corps of Engineers—New Orleans District—Technical Library
U.S. Army Corps of Engineers—Seattle District—Technical Library
U.S. Defense Mapping Agency—Aerospace Center Technical Library
University of Wisconsin-Madison—Biotechnology Center
Upjohn Company—Corporate Technical Library
APPENDIX B

Survey on Handling Microcomputer Software as a Library Material

NAME _____________________________________________________________

LIBRARY/INSTITUTION _____________________________________________

CITY/STATE ______________________ PHONE _________________________

YES NO

1. Does the library acquire microcomputer software
   For circulation to library users
   For on-site use by library users
   (If NO to both questions, GO TO QUESTION 9.)

2. Does the library provide such access to
   Public domain software
   Shareware
   Commercial software

3. Does the library enter into any special agreements
   with software publishers prior to making software
   available to users?
   Site License
   Specially negotiated agreement
   Other (describe)

4. Does the library catalog acquired software using AACR2?
   If NO, what system do you use (describe below)?

5. How does the library inform users about
   software availability?
   Through its main catalog
   Through specialized listings
   Other (describe)

6. Does the library have special circulation policies
   or limitations on circulation of software? (If yes, describe.)

7. How does the library protect publicly-circulating
   software from tampering (check all applicable)?
   Write-protected diskettes
   Protective packaging
   Virus checking upon return
   Other (describe).
APPENDIX B (Cont.)

Survey on Handling Microcomputer Software as a Library Material

8. How does the library protect publicly-circulating software from duplication (check all applicable)?
   - Copy-protected diskettes
   - Warnings on screen
   - Warning on diskettes
   - User agreements
   - Other (describe).

9. Does someone else in your organization provide any of the following software support services?
   - Lending of software for test and evaluation
   - On-site evaluation laboratory
   - Information about the capabilities of software products
   - Recommendation of software for particular applications
   - Other (describe).

10. Is there someone else you can suggest that we talk to about the use of microcomputer software as a library material?

<table>
<thead>
<tr>
<th>Name</th>
<th>Library</th>
<th>Phone</th>
</tr>
</thead>
</table>
Appendix C

Script Used to Introduce Telephone Survey

After reaching person on list: Good morning (or afternoon). My name is (give name) and I'm calling from the Ruth H. Hooks Technical Library at the Naval Research Laboratory. Our Library Director, Laurie Stackpole, has been invited to write a paper for Library Trends on patron use of software in special libraries. As part of the information-gathering process, we are contacting a number of libraries to find out if they are circulating software or making software available to library users on-site. Would you have a few minutes to discuss your use of software for these purposes? (If no, find out when you can call back. If yes, begin by verifying information on name of contact, library, location, and phone. Then begin survey.)

If you are asked why that particular library was contacted. For the first 8 on list: Mrs. Stackpole presented a paper on the circulation of software at the Special Libraries Association Annual Meeting in June 1988. At that time a representative of your library indicated that you would be willing to discuss your handling of microcomputer software for a Library Trends article. For the remainder of the list: Mrs. Stackpole identified the libraries we are contacting based upon their standing in the special library community or the recommendations of colleagues.

If you are asked about the publication of results: Mrs. Stackpole's article is scheduled to appear in the Summer 1991 issue of Library Trends.

At the end of the survey, thank the respondent for participating.
REFERENCES


Denise M. Beaubien is Online Coordinator, Reference Librarian, and selector for engineering materials in the Marston Science Library, University of Florida. She is an active committee member in the Machine-Assisted Reference Section (MARS) of the American Library Association and also a member of ACRL's Science and Technology Section, and Chair of the Electronic Information Services Committee at the University of Florida. Her articles include "Wilson vs. IAC on Tape" in Database (in press) and "The Changing Roles of Online Coordinators" in Online.

Mary Louise Brady is the Head of the Learning Resources and Curriculum Department of the Kennedy Library, California Polytechnic State University, San Luis Obispo, California, and Director of Instructional Materials Display Center for the California State Department of Education. She is former Chair of the Curriculum and Education Librarians Chapter of the California Library Association, and is a contributing author to Developing Microcomputer Work Areas in Academic Libraries (1988) edited by Jeannine Uppgard.

Patrick R. Dewey is the Director of the Maywood Public Library District. He has served in that capacity since 1984. Before that time he was a reference librarian and branch librarian at the Chicago Public Library for ten years. Prior to that he came from Pontiac Michigan to work for Playboy Magazine as Editorial Librarian in 1973. He received his M.S.L.S. from Wayne State University (Detroit) and his undergraduate degree in Psychology from Oakland University. He has written fifteen books, including a series by the American Library Association on microcomputer use in libraries, on bulletin board systems, on interactive fiction, and in other diverse areas such as comic book collecting and fan clubs. He has also written over sixty articles in library magazines and general computer magazines.
such as *Popular Computing*. He is an Associate Editor of *Computers in Libraries*. He lives in Chicago with his two dogs, Hardware and Software.

Halbert W. Hall is Head, Special Formats Division, Library, Texas A & M University. He has been involved in the establishment of the microcomputer facility at Texas A & M since it was established in 1978. He has written several articles on microcomputer laboratory management.

Sheila S. Intner is Professor at the Graduate School of Library and Information Science, Simmons College, Boston, Massachusetts. She specializes in access to nonprint media, including computer software. Author of numerous books and articles in the professional literature, her recent titles include *Technical Services in Medium-sized Libraries* (1991), *Cataloging, the Professional Development Cycle* (1991), *Standard Cataloging for School and Public Libraries* (1990), and *Library Education and Leadership* (1990). She is editor of ALA Books’ *Frontiers of Access to Library Materials* monographic series and writes the monthly “Interfaces” column for *Technicalities*. She teaches, researches, and consults in collection development and management, cataloging and classification, and preservation.

Kathy M. Jackson is Head of Systems Operations, Evans Library, Texas A & M University. Dr. Jackson is a regular columnist for the *CD-ROM Professional*; other articles by her have appeared in *Online*, *Reference Services Review*, and other journals. Her research interests include online catalogs, user/machine interfaces, and the application of microcomputer technology to information management and retrieval.

Raschelle S. Karp is an associate Professor at Clarion University of Pennsylvania, Department of Library Science. Her most recent publications include co-authoring of *Plays for Children and Young Adults: An Evaluative Index and Guide*, Garland Press, 1991 and *Library Services for Disabled Individuals*, G. K. Hall, 1991. Her teaching specialties include library services for exceptional patrons, collection development, business libraries, indexing and abstracting, and science librarianship. She is co-editor of *Current Studies in Librarianship*, and her most recent presentation, at ALA 1991, Atlanta, concerned library services to the aging. She holds the MLS from the University of Illinois and the Ph.D. from Florida State University.

Linda J. Piele is Head of the Public Services Division at the University of Wisconsin—Parkside. She has chaired the ACRL Microcomputer Services in Academic Libraries Discussion Group and published several articles on this topic, including a case study of the
microcomputer services in her library that appeared in *Developing Microcomputer Work Areas in Academic Libraries*, edited by Jeannine Uppgard (Meckler, 1988).

Alice L. Primack is Coordinator of Library Instruction for the Marston Science Library at the University of Florida, and Reference/Collection Development Librarian with a subject specialty in physics and astronomy. As part of her interest in electronic information and how scientists and engineers gather information, she has made presentations and published "Identifying Academic Physical Sciences Research in Progress" in *Collection Building*, 10(Nos. 1/2), pp. 22-28, 1990.

Ileen F. Rockman is Interim Associate Dean of Library Services at California Polytechnic State University, San Luis Obispo, California. She is a founding member and former chair of the Curriculum and Education Librarians Chapter of the California Library Association. She has also chaired both the Curriculum Materials Committee and the Problems of Access and Control of Education Materials Committee of the ACRL Education and Behavioral Sciences Section. She is a contributing author to "Curriculum Materials in Online Catalogs," *College & Research Libraries News* (vol. 51, no. 6, June 1990), and currently serves as Editor-in-Chief of *Reference Services Review*.

June H. Schlessinger is an assistant Professor at the University of North Texas, Department of Library and Information Sciences. Her most recent major publications include co-authoring of *Plays for Children and Young Adults: An Evaluative Index*, Garland Press, 1991, and co-authoring *The Who's Who of Nobel Prizes*, Oryx Press, 1990. Her interests and presentations deal primarily with school library services, collection development, and children's and young adult's literature. She holds the M.L.S. from the University of Rhode Island and the Ph.D. from the University of Connecticut.

PEGGY SEIDEN is Head Librarian at the New Kensington campus of Penn State University. She has spoken and published frequently on access to information about electronic resources and managing software resources. Among her publications is the Directory of Software Sources (Peterson's Guides, 1988) and "Microcomputer Services in Academic Libraries: A Manager's Perspective" in the Essential Guide to Microcomputer Labs in Academic Libraries (Meckler, 1988). She is currently co-chairing the Coalition for Networked Information's Working Group on Directories and Information Resources and is conducting research on developing directory structures for networked information.

LAURIE E. STACKPOLE is Head of the Ruth H. Hooker Research Library and Technical Information Center and Chief Librarian for the Naval Research Laboratory in Washington, D.C. Ms. Stackpole is immediate past chair of the Military Librarians Division of the Special Libraries Association and an elected member of the Federal Library and Information Center Committee of the Library of Congress. In March of this year, she was named by Federal Computer Week as one of its Federal 100, a group of 100 individuals found to have had a major impact on Federal information resource management. The award cited her work in establishing a library-based microcomputer support center.

R. S. TALAB is Associate Professor of Educational Technology at Kansas State University. She is copyright editor for TechTrends and has written several articles and two books on copyright—Commonsense Copyright and Copyright and Instructional Technologies. Ms. Talab is a reviewer for the Office of Technology Assessment and is a consultant and speaker on copyright and new technologies.

DAVID B. WALCH is Dean of Library Services, California Polytechnic State University, San Luis Obispo. He is the author of "The Circulation of Microcomputer Software in Academic Libraries and Copyright Implications" in The Journal of Academic Librarianship (vol. 10, November 1984) and of "Academic Libraries and Campus Computing Organizations: Relationships After the First Century" (Proceedings of the Fifth National ACRL Conference [1989]).
"Library Trends has become the premier thematic quarterly journal in the field of American Librarianship."

*Library Science Annual*

Both practicing librarians and educators use Library Trends as an essential tool in professional development and continuing education. They know Library Trends is the place to discover practical applications, thorough analyses, and literature reviews for a wide range of trends. See for yourself the breadth of topics covered in the 40th volume.

**Software for Patron Use in Libraries**
(Summer 1991) Edited by Denise M. Beaubien, Alice Lefler Primack, and Colleen Seale

Experts in this issue present analyses of current practices in the provision of patron-use software along with considerations for libraries still developing their policies.

**Ethics and the Dissemination of Information**
(Fall 1991) Edited by Robert Hauptman

Taking a broad approach to the subject, these essays discuss some of the most important topics under current discussion as well as issues that will be influential in the coming decade.

**Changing Conceptions of Leadership**
(Winter 1992) Edited by Barbara B. Moran

Leadership in the library profession is examined from a variety of perspectives, including leadership as a field of study, gender differences in leadership, and the roles played by training, assessment, mentoring, and professional education.

**Changing Conceptions of Leadership**
(Spring 1992) Edited by Anne Woodsworth and Ellen Detlefsen

Administration of large research libraries is becoming increasingly complex. This issue discusses the management of professionals with varying subject and functional expertise, cultural backgrounds, and value systems.

Subscription price $60 (plus $5 for overseas subscribers). Single copies are available for $18.50, including postage. Order from the University of Illinois Press, Journals Department, 54 E. Gregory Drive, Champaign, IL 61820.