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ABSTRACT

This volume is the first of two in a report on a state-of-the-art assessment which was conducted to determine the roles of school, academic, special, and community libraries in creating and/or providing viewtext information services; the information resources now available or expected to be available in the future to a sample of libraries in the United States; and the unique contribution that viewtext can make to providing information to homes or businesses. Included in this volume are an executive summary, a state-of-the-art paper, and three appendices. The summary outlines the rationale for the project, discusses its goals, describes the research carried out, summarizes the results of research activities, and presents 10 general conclusions based on these results. Data collected through a review of the literature and consultation with knowledgeable experts are presented in a context paper and bibliography for use by libraries in assessing their role in providing and delivering viewtext information. The paper and bibliography (Appendix A) focus on seven critical topic areas: the role of the library in an information-based society; legislation and regulations related to viewtext; technical aspects of viewtext; the current status of viewtext information services; current applications of viewtext in libraries; the design, implementation, and maintenance of viewtext in libraries; and the social implications of viewtext and the significance for libraries. Lists of major businesses delivering remote electronic access to delivery of information (READI) and libraries providing viewtext services are also appended. (BBM)

The Role of Libraries in Creating and Providing Viewtext Information Services

COMPREHENSIVE REPORT: PART I
EXECUTIVE SUMMARY and STATE-OF-THE-ART PAPER

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TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICES

The Role of Libraries in Creating and Providing Viewtext Information Services

EXECUTIVE SUMMARY

PREFACE

This Executive Summary summarizes the activities and findings of the research project entitled, "The Role of Libraries in Creating and Providing Viewtext Information Services," a project sponsored by the Department of Education Center for Libraries and Education Improvement (CLEI) and carried out by Lawrence Johnson & Associates, Inc. (LJA). Mrs. Yvonne B. Carter was the CLEI Project Officer for the contract, and Dr. Mary J. DeWeaver was the LJA Project Director. Ms. Cynthia J. Prather served as the LJA Project Research Associate.

The major research products are a State-of-the-Art Paper that identifies critical issues regarding the effects of electronic technologies on society at large and on libraries and nine Case Study Reports that provide specific information on the integration of the technologies in a sample of school, academic, public, and special libraries in the United States.

The Executive Summary outlines the rationale for the project, discusses the goals to be achieved, and describes the research carried out to accomplish these goals. The results of the research activities are summarized, and certain general conclusions are drawn, based upon these results. The basic purpose of the Summary is to help disseminate the findings of this research project to the library and information science community and to other interested organizations and individuals. Readers who are interested in additional information may wish to read the full report, The Role of Libraries in Creating and Providing Viewtext Information Services: Comprehensive Report. Part I consists of this Executive Summary and the State-of-the-Art Paper. Part II consists of the Case Study Reports.

ACKNOWLEDGEMENTS

The project team wishes to acknowledge the support of the many organizations and individuals in the library and information science field and in the business community who contributed to this research. We are grateful for the assistance of the many readers at the Department of Education who reviewed and provided comments on the draft materials. We are especially indebted to the staffs of the libraries and media centers at the sites we visited, who provided information for the nine Case Study Reports. We also are indebted to the staff of the Viewdata Corporation of America, Inc., Miami, Florida, for the information they provided on the use of videotex in libraries and the staff of California State University at Chico for the data they provided on the use of Instructional Television Fixed Service in libraries.

The Case Study sites for this research were:

Gaithersburg High School Media Center
Montgomery County Schools, Gaithersburg, Maryland

IBM T. J. Watson Research Center Library
Yorktown Heights, New York

Lorette Wilmot Library
Nazareth College, Rochester, New York

Shasta County Schools Media Center
Redding, California

Pikes Peak Library District
Colorado Springs, Colorado

Minneapolis Public Library and Information Center
Minneapolis, Minnesota

University of Illinois
Urbana-Champaign, Illinois

Miami-Dade Public Library
Miami, Florida

T.C. Williams High School Library Media Center
Alexandria, Virginia

Introduction and Background

The central role of libraries in the United States is the provision of access to information resources to all citizens. To provide such access, communities, schools and universities, and private organizations have established libraries.

Libraries traditionally have provided resources in print formats, and in recent years have supplemented their print collections with films, audiotapes, videotapes, and other audiovisual materials. More recently, information resources also have become increasingly available in electronic formats that libraries cannot acquisition, store, or retrieve in traditional ways. These new information resources are changing both the library services available to patrons and the internal organization of libraries.

Efforts have been made by the Department of Education to assist libraries of various types in integrating new information technologies. The Center for Libraries and Education Improvement (CLEI) through this present research effort, intended to build upon previous studies and investigations to make a comprehensive assessment of the information technologies available to and in use by libraries. Of particular interest to CLEI was the role of libraries in relation to viewtext, a collective term which includes teletext; videotex; bibliographic information retrieval using telephone lines and full-keyboard terminals; and cartridge, cassette, or disc format software used with personal computers or videodisc players.

The present report is a summary of the state-of-the-art assessment of the role of libraries in creating and providing information using viewtext.

The primary purposes of this research effort were to determine: (1) the roles of school, academic, special, and community libraries in creating and/or providing viewtext information services, (2) the information resources now available or expected to be available in the future to a sample of libraries in the United States, and (3) the unique contribution that viewtext can make in providing information to homes or businesses.

Research Methodology

To accomplish the stated purposes of the project, the research team carried out the following principal activities.

- o Conducted a review of literature and data on the current status of viewtext information services available from business and industry.

Current literature on library and information science, educational innovations, workplace automation, and the social and political effects of electronic technology was included in this review. Online databases in education and library and information science, and documents and materials available from the Department of Education, the National Science Foundation, local universities, and the Library of Congress also were reviewed. In addition, experts in areas relevant to the literature search and commercial providers of viewtext products and services were interviewed. A list of businesses providing products and services related to viewtext was compiled from this literature and data search and is included as an Appendix to Part I of the Comprehensive Report.

- o Identified libraries providing viewtext information services from current library holdings or other resources.

From the literature reviewed and discussions with experts, a number of libraries and school media centers throughout the country that are involved with viewtext were identified. These libraries and media centers also are listed as an Appendix to Part I of the Comprehensive Report.

Since the resources of the project were limited, neither the list of businesses nor the list of libraries is exhaustive. Yet, these lists suggest the widespread availability and acceptance of viewtext in libraries and provide resources for further information on viewtext products and services.

o Developed a state-of-the-art context paper, based on the literature reviewed and the interviews conducted.

The context paper discusses the past and current situation of viewtext information services and describes the role of libraries in the creation and delivery of viewtext. An extensive bibliography identifies sources reviewed in the development of the paper.

o Conducted case studies of libraries, including academic, community, public, and special libraries, that are creating and/or providing viewtext information.

Nine libraries were selected for case studies from the list of libraries compiled in (2) above. Libraries selected included two high school media centers and one county media center, two public libraries and one public library district, one small college and one large university library, and one corporate library. Libraries visited were located in urban, rural, and suburban areas in California, Colorado, Illinois, Minnesota, Maryland, Virginia, New York, and Florida. A list of topics to be discussed was approved by CLEI and sent to each site in advance of the site visits. A Case Study Report was written for each site and submitted for comment to the site and to CLEI. The Case Study Reports reports comprise Part II of the Comprehensive Report.

Results

The research activities described above produced two basic categories of information. Data collected through the literature and through consultation

with knowledgeable experts were organized into a Context Paper and Bibliography under the following seven critical topic areas related to viewtext.

- The role of the library in an information-based society.
- The legislation and regulation related to viewtext.
- Technical aspects of viewtext.
- The current status of viewtext information services.
- Current applications of viewtext in libraries.
- The design, implementation, and maintenance of viewtext in libraries.
- The social implications of viewtext and their significance for libraries.

The data collected at the nine site visits were used to develop nine Case Study Reports that contain the following information about each site.

- Library characteristics: location, patrons served, staff, collection, circulation.
- History: viewtext use from its introduction up to the present.
- Viewtext applications: specific viewtext applications observed by the research team.
- Organization and management: the identification of individuals and units responsible for viewtext use at the library site.
- Patron access: the extent to which patrons use viewtext, with or without professional assistance.
- Cost implications: the sources of funding for viewtext at the site and the impact of viewtext on the library budget.
- Program results: any data available or being collected on the effects of viewtext.
- Outreach: communications between the library and other libraries or the community in relation to viewtext.
- Future goals and objectives: the library's future plans for viewtext.
- Lessons learned: experiences related to viewtext that the library can share.

- References: publications available from the library that relate to the use of viewtext.

General Conclusions

The data collected through the literature review and the nine site visits suggest the following general conclusions:

- Libraries of all types are involved with viewtext, and patrons increasingly expect libraries to provide information in these formats as the need for timely and complete information becomes increasingly important in the economy.

- Research and development efforts by Federal, state, and local government have played a key role in viewtext development and use in libraries. The Library of Congress, the Department of Education, the National Science Foundation, and other agencies have provided funding needed for research and development of viewtext and also have assisted libraries in conducting demonstration projects that have resulted in incorporating viewtext into library programs.

- Libraries are involved in all four types of viewtext, both to improve their administrative and technical procedures and to enlarge their services to patrons.

  Teletext and videotex systems using television screens equipped with decoders and keypads are still in an experimental stage in this country. Systems are expensive and databases are limited. Libraries are cooperating in these efforts in their communities, providing a much larger information base than these commercial systems otherwise would have. Libraries answer reference questions and reserve books for users of these systems. They also assist in research on teletext and videotex.

  Systems that use cable television to display pages of information, such as film schedules, are in use in some school media centers; and instructional television, electronic mail and bulletin boards, and satellite conferencing commonly are seen in libraries. Many school and public libraries provide community and educational access to local cable systems.

  Access to interactive databases is available in many school, academic, public, and special libraries, but because of the cost and complexity of accessing these databases, librarians usually conduct the searches. This situation is expected to change as protocols for accessing databases are simplified.

  Bibliographic Information Retrieval online is available in all types of libraries from library databases such as OCLC as well as from databases such as DIALOG and BRS that are in common use in the society at large. Additionally, libraries are increasingly making their own catalogs available to patrons online and providing information online about community activities and services.

Microcomputers are in common use in all types of libraries, for word processing, database management, and accounting; and special-purpose software for all types of library applications is in use or is being developed.

- Libraries increasingly depend on resource sharing to maximize the usefulness of their combined collections. This sharing results in a need for cooperative agreements related to cataloging and acquisitions which require careful negotiations among library network participants.

- Viewtext does not save money, but it reduces the time professional staff must spend on routine work and increases the time available for patron service. The capabilities of technologies such as relational databases also require libraries to reconsider their traditional organizational structures which were based on the use of older technologies that compartmentalized library activities for the sake of efficiency.

- Patrons increasingly are accessing technical information from remote terminals. Thus, in some libraries fewer patrons come to the library, even though the use of materials does not decline. However, many library patrons prefer to use materials in printed form and resist using materials that must be read on terminals or screens.

- Libraries are essential to the use of bibliographic information available online, since most resources identified are located in a library. Interlibrary loan is increasing because of online bibliographic retrieval, and although access to information online results in the cancellation of some journal subscriptions, other journals identified online are added to library subscription orders.

- The introduction of viewtext is associated with high costs for planning, installation, and personnel training. Libraries with limited financial support have difficulty in providing state-of-the-art access to information.

- The work of librarians is becoming increasingly complex, requiring greater technical and management skills.

- Viewtext use in many libraries and media centers is very recent. Research is not yet available on the long-term effects of these technologies on staffing requirements, funding, and equity of access to information. Data also are not available on the long-term storage of materials in magnetic formats and on the durability of viewtext hardware and software. Data on the effects of access to information by patrons at remote locations also are not yet available, and information on patron use and preferences for public access system components is limited.

The Role of Libraries in Creating and Providing Viewtext Information Services

STATE-OF-THE-ART PAPER

I. INTRODUCTION

The role of libraries in the United States is considered to be one of providing all citizens with access to the information resources which satisfy their specific needs. To meet this broad goal for all users, many types of libraries have been developed, serving individuals in different settings. The American Library Association (ALA), in fact, defines libraries as institutions that serve specific patron groups with collections of materials organized to provide physical, bibliographic, and intellectual access and with staff that is trained to provide services and programs related to the information needs of the patron group (Young, 1983).

Thus, public libraries in our society serve geographically defined groups among the public; academic and school libraries serve the information needs of educational institutions of various types; and businesses, associations, government agencies, and other private groups have established special libraries to meet their particular need for information.

The Problem

As their name implies, libraries traditionally met their responsibilities through collecting and providing books and other printed materials. When storage of information in other formats became a reality, libraries began to make nonprint information available as well. However, in the main, nonprint media collections complemented library print collections.

Current technology, in contrast, offers completely new types of information storage and retrieval. Today, it is technically possible to bring almost instantaneously to a reader a vast array of electronic information, ranging from comprehensive listings of titles and/or abstracts of publications

on a particular topic to complete texts of journals, newspapers, and books. The library as a physical entity is not essential either for material storage or retrieval of such electronic information.

The development of this technology has broad implications for libraries and the services they provide. It has forced them, as DuMont (1982) observes, to determine what role they should now play in providing and delivering information and how the new technology should be used in performing that role.

Need for the Study

The Research Agenda

There is evidence that the library community is aware of the fact that determining their role in providing and delivering information through the electronic technologies, which are collectively called viewtext, presents them with major challenges. Indeed, in A Library and Information Science Research Agenda for the 1980's (Cuadra, 1982), library professionals identified 20 topics of greatest concern to them; and a significant number related to providing and delivering viewtext.

The present study was commissioned by the Office of Libraries and Learning Technology (OLLT), now the Center for Libraries and Education Improvement (CLEI), in response to the concerns which the Cuadra Research Agenda identified. CLEI believed that a research study was needed that would offer insights to libraries of all types, and in all parts of the nation, that are grappling with specific questions related to viewtext and are called upon to make informed decisions about their role in its provision and delivery.

This paper is intended to offer assistance to libraries in assessing their role in providing and delivering viewtext. It discusses the historical and present uses of viewtext information services and describes the current role of some typical libraries of various types that are creating and providing

Remote Electronic Access and Delivery of Information (READI), as reported in the literature and in conversations with members of the library community.

The Study Questions

This study addresses, through a review of the literature and communications with library professionals, the following critical issues involving libraries and viewtext.

1. What are the viewtext technologies, and how do they work?
2. What viewtext services are now available to libraries from businesses and industry?
3. What types of libraries are currently using viewtext?
4. In what types of applications is viewtext being used in each type of library?
5. What problems have been associated with the design and implementation of viewtext services? How have libraries solved these problems?
6. What changes has this technology made in the roles of libraries that are providing and delivering viewtext?
7. What are the social implications of incorporating viewtext into our society and particularly into our libraries?

The Study Approach

The research activities undertaken in the conduct of this study have been designed to provide an accurate representation of the role of libraries of all types in relation to viewtext. To carry out this objective, the study began by reviewing an extensive body of literature identified through searches of appropriate bibliographic databases and by reviewing the holdings of the libraries of the Department of Education, The National Science Foundation, the National Commission on Libraries and Information Science (NCLIS), The American University, and the Catholic University School of Library and Information Science. In addition, state education and media service directors throughout

the United States; librarians at public, school, academic, and special libraries; and library network administrators were contacted in person, by telephone, and through correspondence.

Organization of the Context Paper

The critical areas discussed in this state-of-the-art paper were identified through information collected in the literature and data search. These sources also were used to develop the Appendices to this paper. Chapters II through VIII each discuss one of the seven topics which were identified by the research team and the CLEI Project Officer as critical to the library's role in viewtext provision and delivery. These topics are:

1. The Role of Libraries in an Information-Based Society;
2. Legislation and Regulation Related to Viewtext;
3. Technical Aspects of Viewtext;
4. Status of Viewtext Information Services;
5. Current Library Applications of Viewtext;
6. Program Design, Implementation and Maintenance of Viewtext Applications; and
7. Social Implications of Viewtext.

Chapter IX consists of a brief summary of conclusions, based on the contents of the preceding chapters.

II. THE ROLE OF LIBRARIES IN AN INFORMATION-BASED SOCIETY

The National Commission on Libraries and Information Science (NCLIS) defined the role of the library as providing all citizens with access to information resources which satisfy their "educational, working, cultural, and leisure-time needs and interests, regardless of the individual's location, social or physical condition, or level of intellectual achievement." (NCLIS, 1979, p. 1). Young (1983) further defines the library's role as one of making accessible to its patrons materials, services, and programs related to their needs. These broad role definitions offer many possible options for libraries in determining the kinds of services they should provide and the mode of delivery they should employ. In the course of their history, libraries in many environments have adjusted their roles to meet changing realities.

Thus, although libraries began as collections of books, they have long included other print materials as well, such as journals, periodicals, indexes, pictures, and maps. As information became available in audiovisual media, libraries also collected and provided nonprint media on topics appropriate to the scope of their print collections. By the 1970's, many libraries had extensive microform, film, audiotape, and videotape holdings (Quirk and Whitestone, 1982). In addition, as these nonprint collections accumulated, libraries expanded staffing capability to include personnel who could select, maintain, and make available to patrons both print and nonprint materials; and the library environment expanded to provide appropriate hardware and facilities for the use of all types of media. Many libraries also presented information in the form of educational and cultural programs appropriate to the needs of their client populations.

Thus, Quirk and Whitestone describe the contemporary library as a place where the patron expects to be able to check out or read a book; find a periodical; obtain assistance from a reference librarian, either in person while in the library or by telephone; use on-site or borrow for at-home use audiovisual materials and often also the hardware necessary to use them; and attend special cultural or community programs.

New Technology-Viewtext

To a large extent nonprint materials complement the print collections of individual libraries and are owned and cataloged by these libraries. In fact, NCLIS, in its report on bibliographic access to nonprint materials (1979), expre concern that nonprint materials were not being cataloged according to a e cataloging code and thus could not be cooperatively shared among libraries as readily as could print materials that usually are cataloged more consistently.

The new communications technologies, however, represent options for providing and delivering information electronically, using databases that are not the property of any one institution. The services these databases offer were not available previously and must be accessed in non-traditional ways. As this present research shows, the South Florida Viewtron system and other similar efforts, for example, bring directly to television viewers at home such services as encyclopedia searching, direct access to current news articles, and community information.

The large information databases described by Glossbrenner (1983) make available to home computer owners the full text of many current publications, which are now obtainable instantly by the online user, at any location, and no matter how many users require them simultaneously. Cable and satellite television also, as King, et al., point out, provide communications access in

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many communities to a wide variety of information services that formerly were available mainly from libraries.

These new services are not mere extensions of previously existing service, but revolutionary innovations. They require extensive library planning, facilities improvements, staff retraining, and equipment purchases. Hence, although some libraries are participating in the use of these new services, very few have integrated them completely, and many have not yet had adequate resources to become involved (DuMont, 1982).

New Roles for Libraries

However, Quirk and Whitestone point out that increases in information available, coupled with budget constraints, have encouraged libraries to develop online resource-sharing networks. Federal and state funds also have been provided from a variety of sources to encourage these efforts (NCLIS, 1978a). The Department of Education, for example, through its Capacity Building Grants, awarded 17 million dollars to state departments of education and state libraries to provide access to ERIC and other databases. Networking, a well-accepted use of viewtext (Wanninger, 1982), is a new role for libraries accustomed to collecting and housing materials to serve the perceived needs of their own patrons.

The problem for contemporary libraries is to determine the extent to which they should further expand their involvement with viewtext. Should libraries minimize viewtext usage or should they move aggressively to incorporate it as widely as possible? Sleeth and LaRue (1983) observe that many librarians are not convinced that they should provide viewtext services or that all patrons expect them to, since libraries are so firmly associated with books in the public's mind.

Yet, Boaz (1981) points out in her discussion of information access that our society has evolved in the past three decades from one whose predominant activity was industrial production to one in which the collection and use of information, which has been the traditional role of libraries, is the Nation's major commercial activity. She sees a very diminished role in society for libraries unless they move to incorporate new technology.

DuMont (1982) describes the results of the studies by Harris (1975) and Galvin (1976) and national polls by Yankelovich (1978) as revealing a profile of the public libraries as institutions in financial jeopardy, largely because their perceived preoccupation with internal functions and their neglect of the changing needs of patrons have eroded public support for them. She suggests that libraries may have to reassess their commitment to traditional services if they are to integrate electronic information services more fully. They also may have to reconsider their commitment to providing all service without charge.

There is evidence that contemporary library patrons expect and need access to online information services and programs, and these are becoming available to them from many databases outside of libraries. A recent Gallup Poll (1978) seeking citizen comment on libraries found that most respondents were users of print materials and most users were satisfied with library services. Yet, the new library service most wanted, even by general and heavy library users who expressed overall satisfaction with their libraries, was the use of a computer for finding information and locating books. Critics believe libraries must provide such service or they will run the risk of becoming obsolete.

Critics offer many reasons to support this view. Libraries that have a responsibility to access and store information for patron use are overwhelmed by the increase in the amount of information available. Boaz (p. 12) points

to research findings that show a 52 percent increase in science journals alone in a decade. She comments that since scientists cannot expand the time available to access and read these materials, if libraries are to be useful resources they need to develop better, more efficient ways of selecting and retrieving materials. Technical materials in print also have become more expensive and scarce. Indeed, in the recent Gallup Poll the major reason for user dissatisfaction was the unavailability of technical books in their libraries.

Lancaster (1981) expresses the fear that if libraries remain totally book oriented, they may threaten their continued existence. In his view, conversion from print to total electronic communications probably is already technologically feasible. He suggests that research information may be converted first, but says that even fiction and recreational works now in print may, as they are replaced, be converted from print books to presentations on videotapes, videodiscs, or audiotapes.

DuMont (1982) is highly critical of contemporary libraries, saying that they are trapped in their historical roles and are not taking enough initiative to explore new patterns of service. She sees libraries as having the potential to fulfill an important role as information resources for our society, but she believes that to do so they must begin to take greater advantage of electronic technology. DuMont observes that if patrons can access information from their own homes, they will not want to come physically to libraries, nor should they have to. She suggests that libraries must make a planned and conscious shift to an information and professional advisory function.

DuMont suggests that to make this shift, libraries will have to reeducate their personnel. Taylor (1979) also stresses this point. He says that

library professionals must develop attitudes and skills that emphasize service and client satisfaction. Guynup (1983), of IBM's Watson Research Center, observes that librarians will have to leave their libraries and market their services and, to do this well, they will need to develop a familiarity with their clients' work and the information needs associated with it. Lancaster (1981) sees librarians in an information age in the role of professionals equipped to:

1. act as information consultants,
2. offer training in the use of electronic information sources,
3. search sources for clients,
4. synthesize the information obtained from sources,
5. assist in developing electronic information files, and
6. keep researchers up to date on current information in their fields (p. 151).

Eventually, Lancaster believes, the role of the library as a physical entity may diminish, but the need for librarians who are highly professional information specialists will become greater.

The role of libraries as purchasers of materials has the potential to change dramatically, as Remote Electronic Access to Delivery of Information (READI) becomes a reality (Adams and Adams, 1982). Many encyclopedias, journals, and other materials are already available online and can be accessed on demand. Libraries will not need to buy print copies of seldom-used items available online, nor will shelf space be required for their storage and display. Thus, in this area also, the library as a physical entity is becoming reduced in importance, while the role of the library as a provider of information services is expanding. Library decisions about purchasing also will have a critical effect on the publishing industry, for as Quirk and

Whitestone (p. 9) point out, the approximately 104,000 libraries in the United States are the basic underpinning of the book and periodical publishing industry and a substantial part of the market for audiovisual products as well. Libraries play a major role in the activity of these industries.

Sleeth and LaRue, like DuMont, observe that patrons are increasingly able to use home terminals to access information, and they believe that libraries should become equipped to deliver READI. But, unlike other researchers, they think that the electronic library does not present a threat to the traditional role of libraries, but is simply another type of service that responds to the changing needs of constituents (1983). Fugazzi, of the Minneapolis Public Library (1983), echoes this opinion, saying that her library impresses on its users the fact that information to satisfy varied needs is available in many forms, only some of which are accessible through databases.

Education, business, social service agencies, and individuals are struggling to integrate new technologies into their own programs and activities. Ginter, for example, reports that although the first microprocessor was introduced into a school only a decade ago, more than half of our schools now have one or more computers or terminals (1983, p. 105). Many of these computers are, in fact, located in school libraries. Computer use is still higher in business and government worksites (Faflick, 1982). Thus, as the role of libraries is changing, so also are the roles of the library's constituents. A recent study (Schrage, 1983) shows that the phasing in of automation will require phasing out many human workers who will have to find new work, much of which will require familiarity with new technologies. Criner (1981) suggests that all types of libraries can play a significant role in introducing the new technologies to their publics.

The social and economic changes associated with electronic technologies are known to be accompanied by stress, both physical and psychological (Brown, 1981). One important role of libraries should be to study and understand the social and interpersonal effects of technology on library patrons so that library programs and services can meet patron needs for information of all types.

Libraries traditionally have had an important cultural and recreational role in society, and many experts anticipate that this role will expand. As society places ever greater emphasis on technology, Boaz (1982) sees a growing need to conserve humanistic values and promote individual growth. Thus, she sees a role for libraries in providing centers for community activities and sites for educational programs, teleconferencing, and other services. Bradley (1981) offers examples of community libraries that have produced videotapes on topics of local interest for broadcast on local cable channels. Other libraries have provided sites for televised instruction (Schroeder, 1981).

Dr. Stone of Catholic University (1983) also points out that the roles which libraries have previously adopted of providing information services to such special populations as children, the aged, and the handicapped, continue to be essential to these groups and must be preserved.

Nanus (1981) sees libraries in the role of advocates for information consumers. He identifies society's critical information needs as including protection from the distortion or manipulation of information, fraud, violation of privacy, information overload, and exploitation of the "information poor." Libraries have had continuing concern with these issues and their sponsorship of activities in these areas will continue to be critical in an information-based society.

The role of the library, therefore, is not a single one, but a number of complex roles played out in a variety of settings. As is the case in many other occupations, these roles are changing as information becomes available in new formats and work that formerly was done manually is automated.

Overall, the literature reviewed on the role of libraries points to a need for more involvement with technology on the part of libraries, coupled with a greater understanding of their clients and their information needs. Libraries, it would seem, can have a critical role as information providers and client advocates in the new information age; and many are rising to this challenge, as this paper documents. However, to the extent that libraries do not accept these new responsibilities, they run the risk that their traditional role as information resources may be played by other actors. What seems clear is that they cannot be perceived as a 19th Century institution in the 20th Century, when many services which they alone previously provided can be readily secured from other sources.

Ardent library supporters, like playwright Arthur Miller (quoted in Vavrek, 1982, p. 287), believe the library in the United States to be a democratic institution with no parallel, not simply one information resource. They see the library's role as continuing to offer help to writers, scholars, and citizens at large who seek information for a variety of purposes. Critics of the library share this view, yet point out that libraries can both expand this role and carry it out with greater efficiency and more completely, with the aid of new technology.

One problem libraries face in providing and delivering viewtext is the confusing array of regulatory issues that surround the technologies. Chapter III discusses briefly some of those most relevant to libraries.

III. LEGISLATION AND REGULATIONS

Viewtext is, as Shooshan and Jackson (1980) called cable television, "a hybrid technology," which can deliver by telecommunications information that originates in newpapers or books, or broadcast television. However, books, newspapers, telephone transmission, television, and radio are regulated in different and sometimes conflicting ways; and libraries are likely to find increasingly burdensome the development of policies for the legal transfer of information through viewtext. Tydeman, et al. (1982) point out that, depending on the services offered, regulations affecting the technology include Federal Communications Commission broadcasting regulations, Federal and state banking laws, Federal Trade Commission regulations on sales and advertising, copyright laws, utilities regulation, and cable franchising regulation. Thus, broadcasters are licensed by the government, while newspapers are not, and it is as yet not decided whether a newspaper viewed on a television screen will be regulated, or whether videotex, which is transmitted via telephone lines, should be regulated like a telephone communication. Three major regulatory areas of particular concern for libraries involved with viewtext are discussed in this chapter. These are copyright protection, telecommunications regulation, and the individual's right to privacy.

Copyright Protection

Although in general, Section 106 of Title 17 of the United States Code gives the owner of a copyright the exclusive right to copy the work, prepare derivative works based on it, and distribute and perform the work, the House Report on the new Copyright Law (H.R. Rep. 94-1476, p. 65-74) also allows fair use of a copyrighted work in scholarly publications, reviews, instruction,

etc. However, fair use has not been well defined, and the reproduction of copyrighted work remains a controversial issue, more especially since the advent of new technologies which facilitate the copying not only of printed materials, but also of films, videotapes, audiotapes, and computer software.

Since the invention of photocopy machines, libraries have been increasingly involved with the legal problems inherent in information transfer. Where libraries have installed photocopy machines for patrons' use, for example, they usually have posted signs informing users of the restrictions placed on the copying of materials by the Copyright Act (Oler, 1981). Information for patrons on the copying of videotapes, audiotapes, and computer software also now have to be published, and many libraries are concerned that if patrons copy materials loaned by libraries, the libraries may be held liable.

As library budgets have been reduced, libraries themselves have increased their own photocopying to make up for the lack of adequate materials for patron use (Quirk and Whitestone, 1982). Publishers have asked libraries that reproduce copyrighted works beyond the copying limit allowed under the Copyright Law of 1984 to pay fees to the Copyright Clearance Center. The ALA and the Association of Research Libraries have rejected the publishers' guidelines on excessive copying and have substituted their own more lenient fee structure; and the issue of copying continues to cloud the relationship of libraries with authors and publishers.

Libraries that purchase and distribute audiotapes, videotapes, and films have had to devise elaborate procedures for ensuring that the copyrights are respected. Thus, in Florida, the State Media Services Director, Jack Binns, said that their system purchases videotape copyrights for a five- to ten-year

period and must keep records of the length of use overall as well as the length of use of copies made by individual schools and libraries.

Copyright protection for computer software also is difficult to monitor, and this is regarded as a serious problem by libraries such as the Minneapolis Public Library and Information Center that are collecting microcomputer software for loan to patrons (Fugazzi, 1984). Discouraging the piracy of software protected by copyright will become increasingly difficult as libraries begin to loan these materials.

Serious copyright problems also face the library community at large due to the decision of the Online Computer Library Center, Inc. (OCLC) to copyright its database of bibliographic information originally developed for their cooperative use by library subscribers to the service. Such an OCLC copyright is viewed by subscribers as an effort to force them to pay for information which was theirs originally. However, OCLC defends its position, claiming that it does not offer the material as originally provided, but has used the material submitted to produce a database that must be updated continually. OCLC says tnat copyright protection is necessary to prevent the copying of entries that are not accurate.

Bezilla (1982) feels that copyright and transmission regulations already have become irrelevant because they are not able to take account of the relativistic nature of electronic information exchange and because we do not know how to organize and regulate dynamic information, such as graphics and three-dimensional representations that include sound.

The issue is a complex one. The author's and publisher's right of ownership to or original works in all formats must be respected. Yet, the increasing availability of information, the growing ease with which information and media can be accessed and copied, and the costs of purchasing

certain information from its source are combining to create difficult copyright enforcement problems for libraries which must continually monitor the use of the copyrighted materials they provide.

Telecommunications Deregulation

Another area that has serious implications for library provision and delivery of viewtext is the deregulation of AT&T. The ALA, in its news release of 1983 on Telecommunications, discussed the information presented to the Library of Congress' National Advisory Council meeting of October 22, 1983. The ALA warned libraries that they could expect large increases in online connect charges. By January of 1984, it was clear that access charges would increase by over 130 percent. However, the FCC then disapproved a surcharge of $25 a month on leased telecommunications lines, thus reducing the proposed increases to about 106 percent. In February the FCC requested that the companies refile new tariffs; but their new rates were not very different from their previous filing, and the FCC has ordered yet another delay in new tariffs, until June 13, 1984. Libraries represent a very small segment of telecommunication revenues, perhaps 2 percent, according to Ford (1984). Yet, the library community has a keen interest in the tariff outcome and even though the effort is very burdensome, librarians must continually monitor tariff filings and respond with statements reflecting their concern that dissemination of information will be limited to wealthy individuals and communities if libraries are forced to pass on high access charges or discontinue online services.

Eventually, Ford of CapCon (1983) and other experts expect that OCLC and other database providers will be able to take advantage of bypass technologies that do not use local telephone lines. Such a conversion, however, will be

costly and cannot be implemented in the near term. Therefore, substantially increased access charges can be expected to take effect.

Libraries in the public sector, whose budgets are determined on a regularly recurring fiscal year, have no capability to expand their funds to meet sharply increased telecommunications charges. They will be forced to cut staff or acquisitions. Academic libraries will be similarly affected. In fact, Ford explains, librarians feel betrayed by this turn of events, inasmuch as their enthusiastic support of bibliographic databases, which has greatly improved their efficiency and productivity, now exhibits the potential to degrade their services and usurp their capability to expand their collections. If this serious fiscal problem cannot be controlled, it may result in many libraries' losing their primacy as information resources to better funded private information providers who can pass along increases in cost.

Privacy and Confidentiality

A third area of legal concern to libraries is the right to privacy and security of online information (Turn, 1982). Weingarten (1982) points out that computerized information services make information readily accessible, but difficult to secure. At the same time, access to accurate and timely information is becoming the major commercial activity in our economy. The problem of securing information is made even more difficult to resolve by the ambivalence of our society about the nature of information, for we tend to regard information simultaneously as "... (1) a valuable commodity; (2) a free public good; and (3) sensitive material to be kept private and secure" (p. 163). No one will argue that databases that contain information related to individuals' financial, family, behavioral, and health records should be secure, but confidentiality and security of proprietary information in

databases accessible to unauthorized users is increasingly a problem. In fact, the Pikes Peak Library reported that internal library files had been accessed by computer hobbyists in its community (Alfeld, 1983). This incident caused no damage, but it does highlight the need for security safeguards that can provide essential confidentiality without restricting the free flow of information.

Chapter IV, which follows, discusses briefly the technical aspects of several technologies that are encompassed by the four types of viewtext. The variety of technologies included illustrates the extent to which viewtext requires complex regulation.

take place in the future. The term "viewtext," as used in this paper, refers only to the following:

1. Teletext: the one-way transmission, via television, of pages of perishable information to viewers who have TV receivers equipped with decoders (so they can display the data transmitted) and keypads with which to select specific pages from among the 100 or so normally available. The teletext pages are usually sent via unused lines in the vertical blanking interval (vbi) of a regular broadcast signal, but can also be fed via the vbi of a cable signal. All the viewer can do is receive the transmitted pages of information; the choice of which page(s) to watch (plus whatever effect on the display chosen is available via the keypad, e.g., "reveal") is the only interaction the user has with the technology.

2. Videotex: the fully interactive, two-way transmission of information and transactional services via cable, phone lines, or a combination of the two. It allows users equipped with personal computers, or with television sets that have special converters, to access a virtually unlimited store of information from the database of the particular videotex service. It also permits such interactions as purchasing goods or playing games.

3. Bibliographic information retrieval generally using telephone lines and full-keyboard terminals.

4. Cartridge, cassette, or disc format with files that can be displayed on personal computers or videodisc players.

Viewtext thus includes those technologies that blend the capabilities of computers and television, and telephone networks, into systems that can create, transmit, receive, store, and retrieve information electronically (Cuadra, 1982, p. 40). Information transmitted or received as viewtext can include both text and graphics, both color and monochrome. The term incorporates several types of communications media which have in common the ability to display information on the screen of a television set or a computer terminal.

The information to be communicated may originate at a computer and be transmitted by telephone, satellite, or a cable television system to the screen. It also may be communicated to the screen by peripheral storage devices that can transfer text or images. Such devices include magnetic

discs, videodiscs, and videotapes. Thus, viewtext can include static and moving images, graphics, and text transmitted electronically via broadcast, cable, satellite, or other television or by telephone lines or radio and received on television or computer screens.

With these definitions as a guide, an overview of viewtext is provided below, followed by a brief technical description of each of the four types of viewtext.

Overview

As the term implies, the various viewtext technologies involve transmitting text and/or graphics through some electronic mode to a cathode ray tube or television monitor where the user can view them. Therefore, any viewtext systems, whether teletext; videotex; or in cartridge, cassette, or disc format; have three components in common. First, there must be a source that gathers and organizes the information and makes it available to potential users. This is the database. Second, there must be a way to send or transmit the information to those who are authorized to receive it. Third, there must be some way to receive and in some systems to respond to the transmitted message.

Technologies

Teletext is a one-way system by which pages of information are transmitted by broadcast or cable television through the vertical blanking interval (vbi) of the regular television signal. In order to receive teletext, television sets must be equipped with special decoders. Viewers use channel changer-type keypads to switch on the teletext service and, in some systems, to select a category to review from the pages of text available. In some systems, the viewer watches as each page available in the system passes the screen; in other systems, the viewer can request to see only certain pages, and only

those will be presented. However, in either case, the viewer cannot skip any information in the cycle but must wait until the desired information cycles onto the screen. The information being presented either by teletext or videotex is arranged on the screen in pages of no more than 100 words. Words and graphics can be presented in seven colors, and graphics can include charts, graphs, pictures, and even photographic replicas.

Videotex is the fully interactive, two-way transmission of information and transactional services via cable, phone lines, or a combination of the two. It allows users equipped with personal computers or with television sets that have special converters to provide random access to information, both text and graphics, from the databases offered by a particular videotex service.

Darby Miller, in a recent article (1983), explains the typical videotex system as follows. With the help of a numeric keypad or a keyboard, the user selects the desired information from a table of contents (or menu) that lists all available pages in the system. The user retrieves pages of information either by searching for keywords or by following an inverted tree structure that permits the selection of alternatives from one or more sequentially presented specific menus, until the user arrives at the desired information. (Exhibit 1 presents a typical menu.) The user selects the desired information and is immediately able to review it on the screen. The user then can select other pages to review, using the appropriate menu numbers. In some instances, the user also may interact with the system by reserving a library book, asking a reference question, selecting a purchase, playing a game, etc.

Personal computers provide similar interactive capability, but there are important differences between consumer-oriented videotex systems, such as Viewtron, and personal computer systems. Videotex systems, which were originally designed for users with no technical expertise, are far more

Exhibit 1

Sample Prestel Menu

Page

1 Indexes for specialist users
2 General information
3 Business information
4 Local information
5 Alphabetic subject index
6 Alphabetic information provider index
7 What's new February 11th
8 Talking back to Prestel
9 Information for Prestel users
TVS VIEWERS SEE THE REAL WORLD TODAY
Send a message to TVS Real World
ENTERPRISE ONLY .....
PRESS

accessible to such users than are interactive telecommunications systems available through personal computers. Videotex was developed in Great Britain when personal computers did not as yet exist. The original videotex system, Prestel, was implemented using a large mainframe computer. It was designed to be easy to use by the general public and incorporated attractive graphics.

Personal computers are designed to have different capabilities than videotex systems. Personal computers are more efficient tools for business applications, such as word processing, and for such data processing applications as spreadsheets, that permit interactive calculations. However, computers are more limited than videotex in communicating with other computers. The telecommunication software required to link a personal computer to an interactive system is not easy to install and use, and there is a lack of standard protocol for transmitting graphics between computers. A videotex system, however, is simpler to use. It requires only a decoder, attached to an ordinary television set, and a simple keypad with which the user can respond to on-screen prompts. Videotext terminals began as devices that simply displayed information on a home television screen and relayed user requests back to the host computer. But terminals today also can interface with printers and can carry out many personal computer applications. Malloy (1983) points out that personal computers and videotex are aiming at the same market and are both rather expensive for the average consumer. He thinks the two technologies eventually will merge.

Bibliographic information retrieval involves retrieving on a computer screen information from databases that contain bibliographic information. Databases may contain citations, abstracts, or complete source documents. Users search the database for listings of information available on a specific topic or descriptor. In order to use telephone lines to retrieve such

information from databases, the user must have a computer terminal or personal computer equipped with a communications card that plugs into the terminal, a modem, a cable to connect card and modem, a communications software package, and a telephone (Glossbrenner, p. 17).

The purpose of the modem is to convert the computer's outgoing digital signal to an analog signal which the telephone line can transmit and to convert the telephone line analog signal received to a digital signal which the computer can interpret. There are two types of modems, "acoustic" and "direct connect." Acoustic modems use a pair of rubber cups that fasten onto a telephone handset. Direct connect modems plug into a modular telephone jack.

Modems vary in the speed at which they can transmit data, from 0 to 1200 baud (or signals per second), depending on price. Full duplex modems can send and receive data simultaneously as in a telephone conversation, while half-duplex modems allow communication only in one direction at a time.

With the equipment described above, it is possible to access more than 1,350 different databases (Glossbrenner, p.7), including information utilities, such as The Source, which provides access to many types of information and services; encyclopedic databases, such as DIALOG, which provide gateways to many individual databases; news and specialized business information databases, such as the New York Times Information Service; bulletin boards; electronic shopping and banking; and online conferencing.

Many specialized databases containing bibliographic citations for holdings in libraries around the world are online for access by other libraries and increasingly by patrons as well. Wanninger (1982) reports that the OCLC bibliographic database contained over 8 million library entries in May of 1982 and that it had been adding an additional million each year.

Although many libraries offer access to these databases, the cost of access is high and to make this service universally available is beyond the

capability of some libraries. Rural libraries and school libraries, for example, often do not even have telephones (Vavrek, 1982 NCLIS, 1978).

Hall and Brown (1982) point to several advantages that online database searching offers over manual retrieval: (1) the speed of searching can be greatly increased; (2) the user can adapt and improve a search request to match the material in the reference file; immediately switching to new search descriptors if those originally selected are not productive; (3) many databases can be searched from the same physical location; (4) since printouts of the searches can be made, the time spent in manual notetaking can be greatly reduced or eliminated; and (5) databases are increasingly accessible to individuals in their own homes or workplaces. At present, only 100,000 of the millions of computer users own modems, but this number can be anticipated to increase as technology is simplified and the need for information increases. Technology for searching also is still evolving. Many databases already provide full text documents, and new methods for searching text are becoming available. The GESCAN 2, for example, uses a text-retrieved sequential search to locate specific words in a document. The manufacturer, General Electric, claims that the system can search 2,000,000 characters a second for any terms requested by the searcher. The National Science Foundation report on this system concluded that it would avoid the need for human abstracting of text and allow for immediate access of scientific and technical information (Ezaz, 1977).

Cartridge, Cassette, or Disc Format. Several options exist for the electronic storages of textfiles that formerly would have been stored in printed paper documents. Cartridges are used mainly with inexpensive home computers that are attached to television sets for onscreen display of programs. This often is the initial introduction to microcomputers for

families, and most cartridges contain games or very simple programs. A cassette tape of the type used in audiotape recorders can be used to record information for playback on a computer terminal. Such cassettes have been especially popular for storing video games, and some educational material also is available in cartridge format. Many schools have begun their involvement with educational computing with a donated computer, some inexpensive cassette software, and some blank cassettes for storing programs written by teachers and students (Association for Computing Machinery, Inc. 1981). Unlike cartridges, cassettes allow users to develop and store programs. A major disadvantage of using cassettes is that specific information on cassettes can be reached only by playing the tape to the point where that information is recorded, just as is the case with teletext frames. Cassettes also are slow and their storage capacity is very limited.

Computers use two types of disc storage, hard discs and diskettes, or floppy discs, both of which allow random access to information on the disc. Just as a cassette tape is used with a tape player, a disc must be used with an appropriate disc drive.

Hard discs are rigid and coated with a magnetic substance. They can store 5 to 10 megabytes of data and are packaged in cartridges. Each disc costs about $150 and a disc drive costs from $3,000 to $10,000. Winchester discs are a popular type of hard discs that cannot be removed from their disc drive. They are bought sealed into the disc drive and, at $2,500 to $8,000, they are a popular option that provides much more memory than a floppy disc at a lower cost than a regular hard disc.

The most popular type of disc is the floppy disc or diskette, a circular flexible vinyl disc enclosed in a rigid plastic envelope to protect it from damage. A diskette can store 143,360 bytes on 35 tracks that lie in

concentric circles on the circular face of the disc. This is much more information than is possible to store on a cassette and at about $2 each, diskettes are much cheaper than hard discs. Because diskettes can be easily damaged and can store limited information, however, libraries that require extensive storage often upgrade to hard disc systems. The use of microcomputers with both hard discs and diskettes is becoming increasingly common in libraries, for patron computer use and for administrative applications. Users also can move information onto terminals from databases and store the contents of the screen on discs, for editing or for future use. This is a particularly useful feature, since it allows the user to review at leisure material retrieved from the database. Reviewing information online involves paying connect charges.

Many software programs for library circulation, technical services, and reference applications are available on discs for use with a variety of microcomputers, and a number of the libraries described in this report are using such software.

Exhibit 2 is a summary of the viewtext technologies; the types of information each provides; the method by which information is transmitted, using each technology; the hardware required; and the source of the information transmitted.

In Chapter V, some examples of viewtext use in the society at large are described. Chapter VI describes specific types of applications in libraries.

Exhibit 2

Summary of Viewtext Technology

Type of Viewtext	Examples of Systems in use	Types of Information Available	Transmittal Mode	Hardware Required (Depending on System)
Teletext	Ceefax Oracle	- consumer information such as weather reports, stock market information, airline schedules, and movie or television listings, library information, etc.	- vbi of a broadcast or cable signal - whole cable channel - FM subcarrier	- television set and decoder - keypad
Videotex (interactive)	Prestel Teletel Cititel Telidon CAPTAIN	- consumer information such as weather, shopping, electronic bill paying, education, newspapers, daily events, hotels, entertainment, restaurants, library book ordering, electronic mail, games, bulletin boards, etc. - business mail, stock quotes, online conferences	- telephone lines, - cable television, - optical fiber, - satellites,	- television set and decoder - keypad
Bibliographic Information Retrieval	Compuserve The Source OCLC DIALOG	- citations of print and nonprint materials - abstracts of print and nonprint materials - complete texts of journals, newspapers, and other print materials - business information, such as stock quotes - consumer information such as movie reviews, news summaries, weather, and airline reservations	- telephone line	- telephone - modem - telecommunications software - terminal, or microcomputer linked to a mainframe or host computer database
Cassette, Cartridge, or Disc	Educational and business software	- all types of pre-programmed software packages - software programs that allow users to insert data or original programs	- magnetic discs - tape cassettes - videodiscs	- micro-computer - disc drive - monitor - cassette tape player - videodisc player - keyboard and/or keypad.

V. STATUS OF VIEWTEXT INFORMATION SERVICES

Viewtext at present appears to be in a transitional state. Advances in technology are continuing at a rapid pace, as Boaz (1982) concludes; but she says that the significant changes are not anticipated to be in the available machinery, but in what the technologies will be programmed to do. Some examples of present uses are described in this chapter.

Viewtext already is commonly available for many applications, such as telecommunications and cable and satellite broadcasting. Some technologies, such as videotex and teletext, that are still in the experimental stages in the United States, are in wide use in other parts of the world. In the main, viewtext applications are not being designed specifically for libraries because, as King, et al. (1981, p. 3) point out, vendors see much larger and more lucrative commercial prospects in business, industry, and government markets. Because of this fact, the library community must become well informed about the existing technology in order to evaluate the possibilities for adapting viewtext to library uses. In addition, libraries also must continue their participation in the ongoing experiments that business and industry sponsor, which will determine the future uses of those technologies that are still being tested in the United States.

Videotex and Teletext

Still in the experimental stage in the United States are the technologies of videotex and teletext, which originated in the United Kingdom in the early 1970s (Miller, 1983). Videotex systems currently in use abroad include the French Antiope System, the Japanese Character and Pattern Telephone Access Information Network (CAPTAIN), and the Canadian Telidon System. Typical of the telext and videotex systems that now exist are the British systems.

Hudson (1983) explains that British teletext and videotex are different, but complementary systems. They differ in the way that their information is distributed and in the services they provide, but their presentation and color graphics are compatible.

There are two teletext systems in Britain: CEEFAX, the BBC public service system; and ORACLE, the commercial system. Viewers can access either on their television screens by means of a special adapter, often included in the television set at purchase, that decodes the teletext signal and displays pages of text and graphics on a television screen. Using the teletext systems, viewers can select pages of information from an index presented on-screen. Only those pages of text that have been requested are retrieved by the decoder and presented on the screen in the vertical blanking interval (vbi) the next time they scroll past. Waiting time may be several seconds.

The British videotex system, Prestel, is a separate paid subscription service which uses telephone lines to provide subscribers with information contributed to a large database by travel agencies, banks, newspapers, and other information services. Businesses also use the system for private information networks that control the receipt of certain pages of information by selected groups of users only.

Prestel is faster than CEEFAX or ORACLE, offers more information, and allows the viewer to send as well as receive information. Response is instantaneous, since the page of information requested (e.g., airline information) can be accessed randomly without waiting until it scrolls past on the vbi. In Great Britain, 800,000 television sets are now equipped with decoders to receive free CEEFAX and ORACLE teletext programming. British participation in Prestel is less impressive. With 24,000 subscribers, Prestel is the world's largest videotex system; but it mainly serves businesses,

probably due to the fact that although British teletext is free, Prestel videotex is not. Prestel is available in the United States, but is less popular here because of its orientation to businesses abroad.

The major system used in North America is Canada's Telidon System, which offers the same types of services as Prestel, but uses higher resolution graphics. The Canadian system has been modified by AT&T to produce the North American Presentation Level Protocol Syntax (NAPLPS). Although NAPLPS also is likely to become the standard in the United States, there still will not be an international standard. Great Britain prefers its Prestel graphics, saying they are cheaper and already well accepted, while Japan uses yet a third protocol which permits the complex Japanese alphabet to be presented.

Libraries in countries abroad have been involved with the production of teletext and videotex programming. In Britain, for example, the British Library Advisory Council has developed several frames of information for display on Prestel, including frames on library resources and services, reference information of general interest, and teaching frames for computer-assisted instruction. Libraries in the United States and the American Library Association have provided similar information to Viewtron and other videotex databases.

The future of teletext and videotex in this country is uncertain. Knight-Ridder; CBS, Inc.; IBM Corporation; and Sears, Roebuck are convinced that the public is ready to accept videotex (Brown 1984), but Continental Telecom has recently closed down its Manassas, Virginia videotex experiment, declaring it to be premature and a risky investment, even though families in the experiment expressed satisfaction with the service (Mayer, 1983). It remains to be determined whether there is a market for teletext and videotex and at what price. Tydeman, et al. (1982) believe the market is substantial

They believe it includes all households with a telephone or a television receiver, 98 percent of American households. AT&T estimates that the market for telephone videotex will not exceed 7 percent by 1990 (Tydeman et al., p.6). However, cable penetration is expected to rise from 28 percent to over 50 percent of the Nation's homes by 1990 and although existing cable systems are one-way only, and thus could support only teletext, Tydeman says that most new franchise bidding also includes provisions for two-way interactive service. A large consumer demand for videotex also could reduce its cost and make the price of a 21-inch commercial color television set comparable with that of a 12-inch screen equipped with a teletext decoder.

Teletext also has potential uses such as for fire and burglar alarm systems, which could make teletext-enhanced TV receivers popular. Captioning for the deaf is already a common teletext-type application, with 40,000 decoders having been sold at $250 each by Sears, Roebuck (Tydeman, et al.).

Tydeman (1982), in discussing videotex applications, says it is essential to examine policy options and make decisions that capture the benefits of the technology, while controlling its potentially harmful side effects. The five classes of videotex applications he identifies are information retrieval, transactions, messages, computing, and telemonitoring. However, he cautions that the services used may simply reflect what is offered, rather than user wants and needs. Key factors he identifies as influencing acceptance in the many trials of teletext and videotex here and abroad have been ease of access, search procedures used, and waiting time for system response.

Existing database providers in this country, such as The Source, Compuserve, Newsnet, and other businesses identified in Appendix B, now offer interactive online applications such as games and shopping. These databases are text systems, but they could be adapted to include graphics capabilities

if teletext and videotex terminals became popular. Malloy (1983), however, thinks teletext and videotex will continue to be too expensive to attract the general population in the near term. He cites as evidence that this perception is widespread the fact that IBM, Honeywell, and other companies are concentrating their research in these technologies on business applications.

Although business represents the most immediate market for videotex, experiments with videotex and home consumers are also continuing. The Viewtrin service available to subscribers in South Florida provides at-home shopping, banking, entertainment information, and news. This and similar commercial videotex efforts indicate that TIME, Inc.; Knight-Ridder; and other publishers consider electronic publishing a natural competitor to print publication and are attempting to ensure that their organizations will continue to have access to their customers if this new medium becomes widely accepted (Lancaster, 1981).

Home banking also is now possible through the Washington DC Madison National Bank, New York's Chemical Bank, and about 25 other banks in the United States. Participants pay Madison National $15 monthly and must maintain $2,500 in an interest-free checking account. Customers must have a push-button telephone, but the banks provide a Commodore 64 personal computer to attach to their television monitors. The bank hopes to recoup the cost of developing the home banking system within 18 months and expects the system to result in savings in interest and check processing (Rowe, 1984, C-1).

Fully interactive, two-way transmission of information has become an essential tool in many businesses. In its Special Report of October 24, 1983, Businessweek projects international telecommunications as an $88 billion market by 1988, as digital computers multiply throughout business and telecommunication capability becomes an "important strategic weapon to all

companies" (p. 126). It reports that telephone equipment is being rapidly updated to convert all information, voice, data, or image, into digital form. At the same time, microwave radio, satellites, and optical fiber cables are dramatically lowering the cost of sending messages across vast distances.

For example, the United Press International (UPI) and Telecrafter Corporation recently jointly announced the beginning of a new company that will market online news and data about the cable television industry. The new company, UPI Cable Data Corp., will be based in Denver, where its computer will receive data from 260 news bureaus around the world. Service will be offered to UPI's 500 current subscribers as well as to 300 additional cable systems. Cable subscribers also will be able to access the system.

Smith (1983), writing in The New York Times, describes the enormous impact of the worldwide electronic information network in one area, the investment markets. The accessibility of information online already has brought about the demise of many Wall Street firms that could not generate sufficient income to pay for high-speed computers, satellite transmission, video workstations, digital data networks, and laser printouts. Other firms have been absorbed by larger firms. Smith says that the online information available allows investors to check constantly the variables that influence the value of stock. He reports that Peter Solomon of Lehman Brothers was enthusiastic. He told Smith, "Computers have shown us how to manage risk" (p. 47). But Uric Weil of Morgan Stanley told Smith he views the intense, immediate reaction to the information now available as a disturbing element that clouds the original intent of investment market, which was to provide capital. He thinks the stock market is becoming simply, "the great casino in the sky" (p. 46).

The effect of electronic telecommunications in stock trading is typical of the effects of the online availability of data: It has made the physical

location of trading centers continually less relevant. Traders who once gathered on a trading floor to facilitate communication among themselves can now reach both buyers and sellers instantaneously from any place, through electronic messages. Individuals equipped with telecommunications hardware and software can access stock information as rapidly as can stockbrokers, if they pay the charges for immediate access. With no added charge, they can have stock information that is no more than 15 minutes old.

Communication Satellites. Communication satellites are remote-controlled, solar-powered, microwave relay stations in orbit. They are equipped with two sets of antennae (Templin, 1983). One set, used to receive signals sent from earth, are the "uplinks." A second set retransmits signals back to earth, and are called "downlinks." Lerner (1981) describes communications satellites as exciting new techniques for information distribution that can provide instant delivery of voice, data, and images and be used for document delivery, data transmission, television programming, and telephone conversations. She says that satellite usage costs are decreasing as their hardware becomes more durable and their length of life thus increases. Satellites, combined with cable and facsimile transmission, can deliver information appropriate for slow-scan television and can deliver documents by facsimile.

Satellites provide the mechanism for the teleconferences that are being used by many groups to economize on travel costs. When careful attention is given to promotion, production, and viewer interests, Dukes (1983) points out that teleconferences are very successful. The Director of the American Law Institute, for example, told Dukes that his organization had responded to the need of younger members of the Bar for Continuing Education by coordinating teleconferences through the Public Service Satellite Consortium (PSSC), an international nonprofit membership organization. PSSC contracts for users

with different satellites for different needs. Viewers can join the teleconference at any of the 64 PBS stations or use the special facilities provided by hotels such as the Holiday Inns. Teleconferences allow viewers to communicate with presenters through two-way video. Costs are estimated to be comparable to those of onsite conferences, ranging from about $300-$350 per person, but considerable savings in time and travel costs are possible.

Telecourses. In education, Williams (1982) points to the increasing use of two-way communication systems that allow lectures to be presented and students to respond via Instructional Television Fixed Service (ITFS) facilities. Such telecourses allow students to take advantage of advanced courses not available otherwise. They also, of course, extend the concept of the school to include personnel and facilities not present in the student's own area. According to Williams, medicine also is taking advantage of viewtext to accumulate and compare data, both to facilitate patient diagnoses and to improve hospital management. This report details the ITFS programs offered at the Shasta County Schools Media Center, which originate at Chico State University, 60 miles distant. (See Case Study Report 4.)

Bibliographic Information Retrieval (BIR)

BIR refers to the computerized retrieval of information from a database. As the name implies, BIR involves the retrieval of citations and abstracts of printed documents, references and abstracts of nonprint materials, and complete data or full text of the original source document.

Online databases have existed since the 1960's (Hall and Brown, 1982), but originally they were created by organizations for their own use and were not accessible to the public. The first sizeable public access systems became available in the 1970s and their growth has been extremely rapid since then, rising in size from about 250,000 bibliographic citations available in 1968,

to 65 million in 1980, with new references added at the rate of 9 million yearly, according to Hall and Brown (p. 10). Wanninger (1982), however, warns of the problems inherent in this proliferation saying that as databases grow larger, it becomes increasingly time consuming to search and update them.

Glossbrenner says that over 1,350 different databases exist today to meet all types of information needs. Exhibit 3 indicates the types of information available from some popular commercial databases. Griese (1982) recommends that because existing databases contain such extensive resources, instead of developing new databases, users should search the commercially available database market for generalized systems which can be modified. This approach, he says, is more economical and results in using consumer-oriented systems that are more transparent and can be implemented on a variety of hardware systems.

Systems that Use Cartridge, Cassette, and Disc Format Text Files

Examples of viewtext applications involving computer cartridge, cassette, and disc storage are commonplace. Smith (1983), in a discussion of office automation, describes the tools of the modern office as increasingly including small desk-top computers that are used for word processing, data processing, electronic mail, and data retrieval. Information that is input into such computers can be edited and stored on cassettes, hard discs, or floppy discs and also can be transferred virtually anywhere, via cables, telephone wires, and even microwaves that bounce off satellites. Facsimile equipment also can expand photocopying by generating electronically copies of printed materials for transfer over telephone lines to remote offices.

Exhibit 3

Typical Offerings of Some Popular Commercial Databases

The Source

- News and reference resources
- Business/financial markets
- Catalog shopping
- Home and leisure
- Education
- Mail and communications
- Creating and computing
- Source Plus (access to other non-Source services)

CompuServe Main Menu

- Home services
- Business/financial
- Personal computing
- Services for professionals
- User information
- Index

DIALOG Offerings

- General interest material, such as Yellow Pages, encyclopedia, Books in Print, Software Directory, news, etc.
- Business/economics
- Social science/humanities
- Chemistry, medicine, biosciences
- Science, Engineering, Technology, patents
- Law and Government
- Education, including ERIC, dissertation index, grants available.

Computers are receiving wide acceptance in education. Recent teacher surveys (Ingersoll, et al., 1983) have revealed that teachers are overwhelmingly in favor of new technologies in their classrooms. Students at all levels are using computers for a range of educational purposes, from word processing and basic skills instruction to high-level interactive computer simulations. Instructional programs of many kinds are available only in cartridge, cassette, and disc formats.

As computers have become smaller, many types of portable terminals and printers have become available. Individuals can now develop documents on discs and send them electronically to their offices from their homes and can use portable computers for reports and correspondence, even on airplanes. Hotels are beginning to install computer terminals for the convenience of business travelers, and Chandler (1983) expects that these will be as commonly available by the mid-1980s as are color television sets in today's hotel rooms.

Information generated on computer screens is still usually read in paper format, but there is a great variety of types of printers available to provide both finished and draft copy for review while the text of such print copies is stored for reading or editing online at a later time on cassette tape or disc or on microfiche or microfilm that can be read on computer screens.

Lancaster (1981) says that the evidence suggests a likelihood of increased use of such electronic formats for the storage of data. He sees this as inevitable, saying that the future of data storage is intimately connected with the future of publishing and that publication in electronic formats is increasingly common.

Lancaster sees a gradual evolution of communication occurring, from print towards electronic media. He cites as examples the use of terminals to replace printed timetables in railroad stations and airline terminals, the

common use of computerized bank tellers, and the use of computers to read prices at grocery checkouts. He notes that for the past 20 years, computers have been used in the composition of print materials through computerized photocomposition. He reminds us that, indeed, the National Library of Medicine, a pioneer in this field, has photocomposed its Index Medicus since 1964.

Lancaster sees the transition from printed publications to electronic publication proceeding through four phases (p. 138):

1. paper only publication;
2. dual mode publication, in which materials are published in machine-readable and paper copy formats;
3. publication, in machine-readable format only, of new materials; and
4. conversion of paper materials to electronic formats.

While most publications are now still available in paper, dual mode publications, such as Engineering Index and Index Medicus, have been available for several years. Many electronic publications in the third phase also exist, including the databases described previously that are available only online. Still other materials are presently available on cassettes, audiotapes, videodiscs, and computer discs for use with electronic hardware.

There is evidence that the transition to electronic publications is proceeding rapidly in all areas. Costs of electronic publications for large circulation journals inhibit conversion from print, but King feels the new technologies eventually will reduce costs and will result in the use of less energy-related resources, better information services, and higher quality information.

The conversion to electronic publications is aided by the fact that the publication of printed materials using the photocomposition process produces

machine-readable copy which then is used to produce the print copy. Thus, books, papers, and magazines are potentially available for conversion to cassette or disc or directly for use online, even before they are produced in print. Lancaster warns that publications in electronic formats require different techniques for their management and storage, however, because they differ from printed text in many ways. They are volatile, and can be updated. Reader comments can be inserted. In the case of electronic textbooks, instructors can readily resequence materials, and illustrations can be expanded to include displays of actual experiments and models. Potter (1984) also warns that we have had as yet no experience with longterm storage of library materials in magnetic media.

At present, King sees several drawbacks that hinder the transition from paper to electronic communication. Among these are: (1) the high cost of transmitting graphics; (2) the need for better bibliographic systems that will eliminate the ambiguities of terms that now exist to access data; (3) the need for improved telecommunications hardware and software to increase the speed of communication; (4) the lack of standardization in word processing and text editing systems; (5) the lack of a code that would readily identify a specific entry; and (6) the lack of a national information policy that coordinates the legislation and regulation of electronic publication (p. 159).

Videodisc and Videotape

Videodiscs are of two types, consumer and industrial. Consumer-formatted videodiscs contain 60 minutes of playing time, but lack random access or still frame capability. However, they are adequate for storage and playback of materials such as films, that do not need this feature. Goldstein (1981) says that industrial videodisc technology is of greater interest to the information, education, and training communities. Industrially formatted

videodiscs contain 54,000 video frames on one side, and it is possible, through computer control, to access any individual frame. The playing speed of a disc can be adjusted for slow motion or fast scan of frames. The greatest drawbacks to wider use are the cost of production and the fact that discs are limited to 30 minutes of playing time per side.

Marrying a computer to a videotape player also can produce interactive programs that can branch to other segments of the tape; and Pipes (1981) predicts that videotape and videodisc will exist as complementary technologies for several years, while hardware for both technologies becomes simpler to use and smaller.

Wright (1981) considers likely the miniaturization of all video components, which will create more portable and flexible systems that will be more economical and easier for untrained people to use. The Office of Technology Assessment (1982) concurs, saying, for example, that a filmless camera that combines video and computer technology to write a picture on a disc will soon be available.

Libraries are using many of the same technologies that are in use in other areas. In Chapter VI, some of the current applications of these technologies in libraries involved in viewtext are described.

VI. CURRENT APPLICATIONS IN LIBRARIES

In developing this context paper, representative libraries involved with viewtext were identified through a review of the literature and discussion with knowledgeable experts in the library community. Some libraries of all types are providing and delivering viewtext, and there is a great variation in the type and extent of use among libraries contacted in the course of this research.

This chapter discusses the specific applications of viewtext that were reported by school, academic, public, and special libraries and related information taken from the general literature. The names and addresses of specific libraries in each category are listed in Appendix C.

School Libraries

Specific Appplications

State school media supervisors were contacted in 12 states to identify a sample of typical school libraries involved with viewtext. In most instances, individuals at the state level made referrals to supervisors at the school district level or to media directors at specific schools.

The sample of school libraries identified included libraries in rural and urban schools and in communities of different population sizes. School types ranged from elementary through senior high school and included very small schools in isolated rural areas as well as large metropolitan high schools.

Examples of viewtext applications in school libraries in the states contacted, or identified through the literature, are described below. Not all state media directors contacted were aware of school libraries which offered examples of uses of viewtext. It is clear from their remarks, as well as from the literature reviewed, however, that schools are incorporating into their

programs viewtext hardware and software obtained from many sources. Suttles (1983), for example, remarks that many Connecticut schools have received computers, not from school board purchases, but from parent groups directly and that community computer advocates also are pressuring the schools to incorporate telecommunications. State level personnel obviously cannot provide information about all such local initiatives.

In Illinois, Lionberger (1983) reports that school media centers are playing an active role in delivering viewtext. Small high schools are sharing courses taught by one teacher via cable TV and are using two-way systems that allow students at all sites to communicate with the instructor at the remote site. Illinois schools are connected to satellites and can move programs from satellites to the school's television monitors for classroom use, a process referred to as "downloading." Many schools also copy or download programs from cable. A number of Illinois schools have computers available in their libraries for use by students, and four schools have access to the OCLC database on a one-year pilot basis through a state library system grant.

Illinois, in its Recommended Standards for Educational Library Media Programs, advises media professionals that accelerated technological change has affected and will continue to affect all aspects of their services (p. 2). Libraries of Illinois, according to this publication, must work together, sharing resources to achieve maximum benefits with maximum economy. School library media specialists are asked to:

1. know the capabilities, applications, and implications of computers in school programs;
2. understand how to incorporate the computer into school programs;
3. be able to operate the microcomputer and train others to do so; and

4. participate in selecting and evaluating hardware and software, catalog and house software, and provide leadership in using computers.

Lionberger identified three school districts in the state having full television production and reception capabilities and six school districts having extensive computer programs. Both the television and computer programs involve media coordinators directly, he said.

In North Carolina, Brumbeck (1983) reports that a number of school libraries are using electronic mail and online databases, and the Greensboro County Schools use SOLINET, a regional library network, for technical services applications. The state also has teleconferencing capability and is able to download information to schools from the central office. At eight sites, schools use slow-scan television, and experiments with viewtext uses are beginning in North Carolina's Math and Science High School. The school libraries have a 20,000-volume hard disc catalog and processing system in use.

New York State has ongoing viewtext projects in a number of counties. Monroe county, for example, is a major center for instructional computing in the state, and computer applications in its libraries are described by Griggs (1983) as "pretty sophisticated," and include online union catalogs and interlibrary loan systems. Training for school and public librarians has been funded through school library funds.

In Buffalo, New York, school librarians enter data on new acquisitions into an Apple computer connected to a technical center at which secondary school students are receiving advanced computer training. Libraries now can also call up other schools' collections, which allows sharing of resources not previously possible in the state.

In California, Church (1983) describes several schools as very involved with viewtext. El Dorado County has electronic bulletin boards in its

schools. They are operated by teachers, but it was pointed out that for the 6,000 schools in California's 1,100 school districts, there are only 2,000 credentialed librarians. Hence, responsibilities appropriate to library-media roles often are carried out by teachers.

To augment the resources of individual Shasta County Schools, a central facility, the Shasta County Schools Media Center, offers a number of services. The Center's two-way microwave link with Chico State College allows University classes to be broadcast to county students, with direct conversation between teachers at Chico and students at remote locations.

Florida's state media director (Binns, 1983) said his office does film and videotape duplicating for schools and ships 30,000 items yearly by UPS to county schools, community colleges, and state universities. The state buys rights for 5 to 10 years of use in its educational programs. Users can borrow tapes for two years on a trial basis, after which they must send a blank tape to be duplicated if they decide to keep the tape in their collections. A catalog of tapes shows the use period allowed and is updated every two to three months.

The state film and videotape distribution system is maintained on a CPT word processor, and has a search function that can sort by date, user, material, date shipped, loan period, and use to date. Binns also has a consulting engineer on staff to offer assistance to schools and lends videotapes in all formats to accommodate available local hardware.

One Florida county, Lee, has a videotape library and uses two ITFS channels, with programs scheduled by computer. Every library has a terminal. Any library can check the schedule to see what will be broadcast on the channels and can insert a tape it wants shown in a free space on the schedule.

Two schools in Lee County were described to exemplify viewtext involvement (Tapio, 1983), Cape Coral High School and Gulf Elementary School. Both schools use the FOLLETT microcomputer library management system to schedule ITV programs by computer. The system was pilot tested in the 1982-83 school year, and is now fully operational. Cape Coral was described as having an excellent student television production program directed by the school librarian. It is planning to add three ITFS channels. The high school recently installed 15 Apple computers in the library, and the two schools plan to develop a computerized union catalog.

Gulf, another Florida County, has five schools, two secondary and three elementary. They have 200 titles on 16mm film and 4,000 titles on videotape. Every school in the County is wired for instructional television, and most classrooms have videotape recorders. Media centers organize the television activities.

In Minnesota, the three small rural school districts of Eagle Bend, Bertha-Hewitt, and Clarissa are using interactive television instruction, delivered via microwave, to allow students to share instruction that would be impractical for such small schools to provide individually and to avoid consolidation and busing. The South Washington County School District also is using cable TV broadcast from the high school to provide instruction in Spanish to advanced elementary school students. Closed circuit television also is available within that school.

In Virgina, Dale Brown, media director for the Alexandria Public Schools, described several schools in that system as involved in viewtext provision and delivery. The Barrett School, for example, has an interactive video system with a microcomputer videodisc interface. These schools also communicate by electronic mail with schools in California.

There are two microcomputers in each library-media center in the Alexandria system, and there are plans to increase this number to three. The micros are used for Computer-Assisted Instruction (CAI), and software is available in a variety of curriculum areas, especially the software developed by the Minnesota Educational Computing Consortium (MECC). Schools now use Channel 53 for instructional programming, and they soon will have cable TV in the schools as well.

In three secondary schools, the media centers have telecommunications capability and have access to DIALOG. The schools are training secondary teachers to make use of the capabilities of the databases and evaluating the skills required to teach students to do online searches. Brown said that the program at T.C. Williams Senior High School was particularly outstanding because that school includes academic, vocational, and business courses and serves a large, cosmopolitan student population of varied socioeconomic and cultural backgrounds.

In Indiana, Edgelea is described as representative of the 14 schools in the Lafayette Corporation, which has 11 elementary, two junior high, and one senior high school. Television and computer technology are under the direction of Media Services. School library-media centers in these schools have four or five computers as well as in-house television production and closed-circuit broadcasting capabilities. There are videodisc machines in each media center. The schools have created interactive videodisc programs and also are creating programs for the local cable channel.

The Irvine Unified School District, in Irvine, California, has a unique two-way cable network that links 24 schools in the district, the public library, City Hall, the University of California at Irvine, the Community

Science Experience Center, Saddleback Community College, and a local art museum (Ritter, 1983). Each school can share resources with the others, and anyone in the community can watch school programs and participate by telephone.

The Staples, Minnesota, High School Media center is described by Peterson (1983) as having one microcomputer for the use of the center staff. Using database management software, it has automated its book ordering and developed an audiovisuals catalog and a periodicals file. It also is using the system to keep track of film rentals and has developed key word indexes. It uses a word processing and mailing list program to write overdue notices, reports, and correspondence and an electronic spreadsheet program to develop grant proposals and monitor its budget. Paperback catalogs that can be easily updated have been created and printed out for teachers.

Lindberg (1983) describes the program of the East Detroit High School Library as including an automated circulation system program written by students, which tracks overdue materials and keeps bibliographic records for the 22,000 items it circulates each year.

General Comments Based on the Literature

Ingersoll, et al. (1983) report that the most common location for a microcomputer in elementary schools is the media center, while a separate classroom is the most common location in upper schools. However, even in secondary schools, the media center is the next most likely location. These researchers say that their survey of computer use in schools shows that one-third of the nation's public schools now have computers, with Apple having the largest market share, followed by Radio Shack and Commodore. These findings leave little doubt that many school libraries could become involved in viewtext, since the basic hardware and software are available.

School libraries increasingly have access to online databases; and software already has been developed to help students and teachers use flexible, fast, command languages to search databases (Swigger, 1983). Swigger, in fact, recommends that database searching be incorporated into students' library skills instruction. This is being done in many schools, and Durbin (1983, p. 431) identifies over 100 elementary and secondary schools that are members of networks and were using OCLC services in December 1982. He says that there also are other school users that were not identified because they are not OCLC members, but that received OCLC services through contracts with OCLC members that are processing centers or state, public, or academic libraries.

Pond (1979, p. 236) points out that the inclusion of school media centers in online library networks is appropriate both because school media centers serve so large a number of students and because the librarians in these media centers are in some instances the only professional librarians for large geographic areas.

Sorell (1983) reports that media centers are making use of microcomputers for record keeping tasks, taking advantage of the capabilities of database software for processing overdue notices, storing selection information, ordering and processing materials, and developing bibliographies.

The Task Force on Education and Technology (U.S. Department of Education, 1980) discusses many other exemplary applications of viewtext in school classrooms and media centers and points to the need for national leadership in integrating educational technology into all areas of education. However, in spite of the rapid acceptance and integration of viewtext in many school media centers, the data collected in this present study also show that funding for viewtext is very limited in some parts of the United States. Barron (1977)

comments that the trend towards the decentralization of control in schools, which results in greater autonomy at the school building level, is likely to have a negative effect on school media planning. This observation was borne out by the experiences with viewtext reported in the present research. (See Case Study Report 4.)

Academic Libraries

Specific Applications

Academic libraries using viewtext were identified through library and education literature, NCLIS, and the CLEI Title II-C program officer. Academic libraries are using viewtext both for technical services and direct user applications. Many are improving and enlarging online bibliographic search services for their staff and patrons and making their catalogs available online to patrons and to other libraries through projects described in the Department of Education's 1983 Abstracts on the Strengthening Research Library Resources Program.

Jay Lucker, Director of Libraries at MIT, says that the university eventually plans to develop a "wired campus," which will link all departments by computer. The libraries would, of course, be a part of such a system, which would provide access to their catalogs, reference services, and electronic mail. Another major library project involves the development of a database of visual still images, such as slides, on videodiscs. The university is experimenting with such a system, because it has found 35mm slides difficult to store and retrieve. The first project will be the indexing and storing on videodisc of its Islamic architecture slide collection. The system will not only provide access to this collection, but also will be able to store successful search protocols used by patrons so that similar searches can be done subsequently with less difficulty.

A spokesperson for Donald D. Dennis, The Director of the American University Library in Washington, DC, says that the library provides circulation information to patrons from a central terminal, located near its card catalog. It also has online serials searching capability, but at present a librarian assists patrons to use this service.

There is an extensive non-print media department in the library. Patrons can view videotape cassettes from the library collection or ones they bring to preview. Monitors are housed in carrels and earphones also are provided. This center also provides off-air taping for use by the school's teaching staff.

Joseph Hewitt, of the Wilson Library at the University of North Carolina at Chapel Hill, describes an online system that is being developed cooperatively by that library and libraries at Duke and North Carolina University. The system will provide online access to the combined holdings of 7,000,000 volumes in the collections of all three libraries. It will be accessible to users on the university campuses, to private and government researchers at the nearby Research Triangle Park, and to users in the state's public libraries. Off-campus libraries will need to provide terminals and dial-up access to users. The system is not yet fully developed, but will be field tested in the spring of 1984.

At present, the Wilson Library provides access to commercial databases for its users and charges for connect time only. Library staff perform searches on request at no additional charge. The service has grown in popularity over the five years it has been available, from 500 searches a year at the Academic Affairs Library to about 2,000, and Hewitt says the campus Health Library does about three times that many. He says that online searching is taking a good

deal of staff time, and for this reason the library does not promote the service as much as it could. Even so, however, it anticipates a requirement for additional staff to handle the growing demand.

Nancy Anderson, of the University of Illinois Library at Urbana, says that the library has acquired and entered into the OCLC database a document delivery and reference system for monographs in mathematics that have been reviewed in Mathematical Reviews. She says that their OCLC inquiries have shown an increase because of this project, especially for math materials in Russian.

Barton Clark, Acting Director for Departmental Services at the University of Illinois, says that he is conducting a research effort to identify the unseen users who access the automated circulation system through computers and the available public access ports. Faculty members can order books online and have them delivered. Eventually, they also hope to have an electronic reference service. These services can be expanded through BRS Night Owl and other online systems to the point that users would not need to come to the library at all. Clark has developed an electronic questionnaire which will be put on their mainframe CYBER system and also mailed to library users to collect data on the services people are now using and what they expect to be able to use. In the spring, Clark plans an online conference funded by a grant from the Association for Research Libraries to solicit ideas on electronic library services.

The University of Florida at Gainesville has highly computerized library facilities. The staff produces and scripts many videotapes for later taping in the University's Learning Resource Center. Both individuals and classes use videotape recordings, and many university classes are videotaped while in session for later review by students. Library use instruction also is offered

on videotapes. The Health Center Library has an extensive collection of videocassette teaching tapes, as does the Law School Library. Sam Gowan, the University Library Director, says that their Law Library has one of the most sophisticated computerized search services in the country. He says that the University Library also buys databases on magnetic tape, for loan with the accompanying documentation. Tape borrowers can use the facilties of the nearby Northwest Florida Regional Data Center to manipulate the tape data. Examples of databases available for patron loan are the 1960, 1970, and 1980 Census tapes.

They are coordinating the development of a serial interlibrary loan system for 13 libraries on a central online database which will have all currently received serials in the southeast, and their locations. The system is intended to require that information be keyed in on any serial only one time. They also are planning a pilot study on the use of computers and vidediscs for the transfer of printed words to computer storage and then to databases. The University of Florida Libraries also have a significant program for visually impaired patrons that includes the use of computer databases with audio output and Kurtzweil readers.

Access to online bibliographic data on library holdings is making widely available specialized collections such as those of the Fondren Library at Rice University, which is processing NASA Space Center documents that include data on spaceflight projects for research use.

General Comments Based on the Literature

Academic libraries often are centers that provide online bibliographic services for their geographic areas. NCLIS (1978) identifies many such academic libraries and bibliographic centers associated with academic institutions in its survey of libraries and network organizations. Included

in its report are the AMIGOS Bibliographic Council at the University of Texas in Dallas, the Boston University Mugar Library, the Library at the University of Wisconsin in Green Bay, the Pittsburgh Regional Library Center at Chatham College, and the Library of the University of Massachusetts at Amherst.

At Stanford University, the Stanford BALLOTS (Bibliographic Automation of Large Library Operations using Time-Sharing, now the Research Libraries Information Network) system, an online interactive system, has been supporting the acquisition and cataloging operations of Stanford University Libraries since 1972. It is used for ordering, receiving, cataloging, reference input, and maintenance. Boaz (1981, p. 107) calls RLIN a "macro-network" which began as a single-library automation effort (BALLOTS) and later evolved into a network of research libraries. RLIN's system is based on the belief that large research libraries have different needs than do smaller academic or public libraries. The RLIN system gives particular emphasis to authority file control and pure MARC (Machine Readable Cataloging) records.

OCLC, Inc., the largest computer-based network in the United States, serving thousands of libraries of all types with interactive online shared cataloging based on Library of Congress MARC tapes, also began in the 1960s as a network of academic libraries in Ohio. Although OCLC was at first only a cataloging resource, it soon achieved the unanticipated benefit of providing interlibrary loan information, since the online system contained book locations. OCLC also has broadened its applications to include acquisitions and circulation systems and to provide at-home users with consumer information through a cooperative arrangement with The Source.

At Nazareth College in Rochester, New York, the library considers its provision of online searching to be a cost-effective method of providing current data in dynamic fields. Of considerable interest is its experience

that online searching capability has increased the need for print materials. The Director of Reader Services said that the library now purchases additional journals to respond to newly recognized user needs (Smith, 1983).

In addition to interacting with students, academic libraries are reaching out with services to their business communities. Lehigh University Library, for example, provides a fee-based source of technical and business information to five industry subscribers that includes a mix of such traditional and electronic services as database searching; direct borrowing; document delivery, including telefacsimile; and information consulting (Cady and Richards, 1982).

Colleges also are making educational services available through public libraries and school media centers. Waubonsee Community College in Aurora, Illinois, has an exemplary program of telecourses provided through satellite centers in four public libraries which took on at no charge the responsibility for making the courses available. Chico State University, as previously mentioned, also provides courses in the county school system through ITFS.

Public Libraries

Specific Applications

Public libraries involved in viewtext were identified: (1) from the literature; (2) by state school library directors; and (3) by CLEI staff, ALA staff, and other members of the library community. As is the case with school libraries, access to viewtext often is the result of local initiatives, and no centralized information on viewtext exists at the state or national level. In some instances, public libraries are involved in short-term research experiments with viewtext, but state-level personnel are not always informed when such activities are completed. The public libraries discussed below are representative of viewtext users.

In Minneapolis, the library system is involved with viewtext on several levels (Fugazzi, 1983). The main library was a pilot site in 1974 for Lockheed's DIALOG. Since then, it has provided online searching for patrons. The first eight minutes of a search are free. Patrons with a more extensive search must pay $40 an hour, plus connect charges, and they get individual attention from a library professional. The system, called INFORM, offers all major databases, including BRS, DIALOG, SDC, NYTIS, and Mead Data Nexis. The library also uses OCLC's bibliographic retrieval and inter-library loan systems, both of which Fugazzi describes as very popular.

There are four terminals in the main library. Patrons can request searches at the system's 14 branch libraries, but, since terminals are not yet available at branches, the requests are transmitted to the main library. The library system is a dues-paying member of the county's MELSA network, which links 99 public libraries in the Twin Cities, each of which has been equipped with an Apple computer. These computers will allow all MELSA libraries to access databases directly and to communicate electronically with each other.

All entry-level personnel in the Minneapolis system receive search training directly from the vendor. This training, Fugazzi says, keeps the information about all systems current and accurate. The different vendors give workshops on a regular basis in the main library, which lowers the cost of training to the library.

In January, 1984, the library began circulating computer software on an experimental basis for home computer owners. However, in the library itself, terminals are not accessible to users. Fugazzi stresses that online searches should be regarded as just one possible tool for information gathering. She also encourages this attitude among patrons.

In Broward County, Florida, libraries are participating in the Knight-Ridder Viewtron home information service which provides information on home banking and shopping, news and weather, games, consumer affairs, and book reviews and library news provided by the ALA offices in Chicago. The Broward Library System provides a list of popular titles (best sellers are never reserved), which is updated frequently. Books cannot be reserved online, but there is an online reference desk service. Broward County also provides a calendar of activities and information on all of its branches.

In Dade County, Florida, public libraries also have provided information to the Knight-Ridder Viewtron service, since October 30, 1983. The Miami-Dade Public Library contributes annotated reading lists from which users can reserve books online and indicate their choice of delivery points. A librarian checks the online reserve index periodically and responds to the individual user online that the item requested either will be reserved when it is returned, be held at the main library, or be delivered to a branch convenient to the patron. There also is a reference feature. A question entered by 2:00 p.m. will be answered by a librarian by 4:00 p.m. the same day, with question and answer displayed for all users to share.

The Pikes Peak Library District in Colorado Springs includes a library housing the District's administrative headquarters and eight other branches. The Library District provides an online database of catalog information, community services information, and a job bank, which patrons can access free of charge at the library or from their home computers. The home computer user signs an agreement not to access other library data, but there is no other requirement or charge for access to the databases. In the library, commercial database searching also is available to patrons, but there is a charge for

this service. It is reported that there have been some problems with users breaking into the library's internal online accounting and correspondence files, but to date no damage has resulted.

General Comments Based on the Literature

While public libraries are located in all types of communities, Vavrek (1982, p. 283) points out that 82 percent of public libraries serve communities of 25,000 or fewer individuals. He says that these libraries, not the large city public libraries, are the mainstream of public librarianship. In such communities, local libraries are likely to be the only source of information, yet the staff and resources of these libraries are exceedingly limited. He sees the new technologies as very useful to these institutions, allowing them to use small computers for cataloging and to communicate with vendors and borrowers. He sees viewtext as greatly expanding the library's outreach, for example, by allowing any library film program to be broadcast simultaneously through cable TV to all home viewers.

Special Libraries

Specific Applications

Special libraries predominantly serve the information needs of businesses, industry, law firms, medical practices, and other profit making and nonprofit entities which have an ongoing requirement for information to improve their efficiency and productivity. The special libraries referenced in this paper were identified in the cited literature; by the ALA and NCLIS; and from CLEI, Title II-C project records.

A number of special libraries are involved with viewtext in converting bibliographic data on their special collections into machine-readable formats that can be accessible online. A spokesperson for Donald Simpson of the Center for Research Libraries in Chicago says that the library converted its

current catalog information to OCLC, beginning with cataloging records from October, 1981. It is now carrying out retrospective conversion of cataloging records prior to 1981 and has converted its U.S. newspaper records to the OCLC newspapers database. The library can receive information requests four ways: 1) teletype, 2) OCLC, 3) RLIN, and 4) Tymshare. It is planning an experiment to see which types of materials can be accessed most easily by the different systems. Through Tymshare, it is connected to the British Library and can transmit requests from members for journal articles. Using this system, materials can be transferred directly to requesting libraries without going first to the Chicago Library.

IBM's T.J. Watson Research Center Library is the largest of IBM's libraries and serves mainly research scientists and mathematicians. Users can access databases from terminals at their own workplace, or they can request searches by librarians. They also can log on and find out what is available at any of IBM's 100 other libraries. IBM has sent two of the librarians from this library to spend two consecutive six-month periods with NCLIS to investigate the uses of technology in libraries and the influence of technology on productivity.

The libraries of the New York and the Missouri Botanical Gardens are converting collections on plant science, and the Pierpont Morgan Library is making accessible materials from its Gilbert and Sullivan Collection by entering bibliographic data into the database of the Research Libraries Information Network (OLTT, 1983).

James Shelar, librarian at the large law firm of Arnold and Porter in Washington, D.C. said that the availability of online searching had greatly expanded the sharing of resources among law libraries and stimulated the development of union catalogs. Before online bibliographic searching was

available, he often had to spend days locating needed materials. Now, materials can be located easily, even in other cities, and sent by facsimile or electronic mail to the library requesting them.

General Comments Based on the Literature

Special libraries offer a very wide range of services and collections, and Lubans (1978) points out that in such libraries, more than in other types, patrons expect that librarians will provide needed information on request, with little user effort. Therefore, librarians have to use imagination in developing strategies to involve patrons directly in information retrieval. For example, at the Statistics Canada Library in Ottowa, librarians have begun conducting coffee-break demonstrations of online bibliographic searching techniques. Luban reports that special libraries also are beginning to identify for users information accessible online in their special areas of concentration. As mentioned previously, many university libraries, such as Lehigh, have cooperative arrangements with business libraries, and Cady and Richards report that special libraries that have the most sophisticated levels of service are the ones that also subscribe to Lehigh Library's additional services.

In some special libraries, online charges can be passed on directly to clients, while charges for searches in other media usually are not. For this reason, online searching is more advantageous than are the traditional searches through printed materials that result in labor costs not easily billed directly to clients. For example, in law libraries, online access to the Mead Data Lexis database not only provides quick retrieval of information, but permits firms to pass on to clients the expense of online searching.

VII. DESIGN, IMPLEMENTATION, AND MAINTENANCE OF VIEWTEXT IN LIBRARIES

According to King, et al. (1981), the changes that are sweeping through our society, bringing automation to all areas, are only beginning to be felt in libraries. Yet, they point out that even the early implementations portend substantial changes in library activities. They stress that libraries must use imagination in determining how the capabilities of the technology now available can improve their role as communication facilitators. Boaz (1983) warns that libraries must make decisions about new technology with great care. She thinks it likely that most libraries will use the three-stage process identified by Goldhar (1977). In the first stage of his model, a library uses new technology to perform old functions more economically and efficiently. In the next stage, libraries begin to reorganize, change their policies, and hire personnel who can make the processes developed in the first stage even more productive. In the final stage, the library begins to use the capabilities of the system to perform new functions and offer services not possible with the older system.

Key Areas of Viewtext System Design and Use

The literature and discussions with library professionals suggest that if librarians are to benefit from viewtext, they will need to give attention to three key areas:

1) involving users in the system design;

2) designing systems that meet functional needs most efficiently, recognizing that this may require reorganization; and

3) taking advantage of opportunities to be involved with viewtext experiments.

Involving Users

Boaz (p. 117) points out that although information is in large supply, many people are information poor. She expresses her agreement with Gantz and Goldhar that information services will succeed to the extent that they meet the needs of users rather than require those users to adapt their needs to the output of the information system. But user needs can only be taken into account if users are involved in the system design. Therefore, user groups should be identified, not only among traditional information users, but among current non-users as well. She recommends that representative users and non-users in the community with a variety of information needs should be involved in designing a new system. She sees user input as critical, not only at the planning stage, but in the implementation stages as well.

Head (1983), in discussing the importance of designing computer systems for the end user, makes the same point. He says that systems that are designed with user needs in mind are more economical, more easily maintained, and flexible enough to assist the user to retrieve or process information at any point where it is needed. Such systems also are more efficient because they allow users to control access without professional assistance.

User instruction of different types is appropriate as new systems are introduced. For example, for some end users, instruction in online searching will be appropriate only for helping them to formulate questions efficiently. Thus, for example, Thompson (1983) reports that scientists may seldom need to use databases, and hence they will not get sufficient experience to do their own online searching. However, they can profit from seminars on planning an online search to be carried out by information specialists because, as Hawkins and Wagers (1982) remind us, searching is essentially problem solving. It requires knowledge not only of the database and how to access its information,

but also of how to develop and refine the search question and evaluate the output received. A patron who is aware of these points can take advantage of a reference interview to clarify his or her information need.

Pritchett (1983) says that in designing an information system, those who are to use it must be convinced that it is intended to help them get information in a useful, timely, and effective manner. He recommends that users be asked to write out typical questions to which they need answers, describe the format in which they need information, and determine the data they would need to have already in order to answer the questions they pose. With such user input, libraries will be better able to evaluate hardware and software realistically in terms of what users will need, whether they are library employees using the system for administrative functions or patrons and librarians conducting information searches.

However, Atkinson (1977) warns librarians to be aware of the serious consequences of the users' understanding of library systems. He cautions librarians that online service puts the priorities for library services in the hands of users. They can see for themselves, for example, how many people are waiting for a book and can begin to influence purchasing policies to shorten the waiting time by the purchase of additional copies. He stresses that these types of issues are the ones with which librarians should be concerned and warns them not to take responsibility for the technical side of automation. Instead, he urges librarians to put their efforts into identifying and describing to the technical experts the functions that the library must carry out and then insisting that the systems analysts design computer programs that will support these functions.

Designing for Library Functions

Viewtext can be used to carry out many traditional library functions, such as acquisition and cataloging of information, both print and non-print; retrieval and circulation of information for users; publication of catalogs of materials available in library collections; transfer of materials from other collections for clients' use; and provision of reference service. Ma... (1977) describes several types of circulation systems which libraries c... select. Vendors such as Guyford have designed ... -operated circul... networks that have a common database for all user l...ies and a com... identifier for all items. Languages used vary among ...rs. Some vendors use proprietary languages, while others use nonproprietary languages and standard equipment. The quality of user documentation also varies. Users reported to ALA (p. 234) that automated circulation systems do not cut costs but do increase worker productivity, a finding supported by the Case Study Reports of the present study. Although problems are encountered, users of automated systems usually do not desire to return to manual systems. McClure (1980) says that small as well as large public libraries will be able to take advantage of online reference systems as equipment cost decreases, trained staff becomes available, and patrons become more sophisticated in system use.

Many library operations are analogous to those performed in business. Gray (1981) says that to be of value in a business environment, an automated system must be designed to have three capabilities: 1) recordkeeping, 2) ability to manage ongoing operations, and 3) usefulness for strategic planning. In developing business databases, he says, business looks for systems that provide integration and eliminate overlapping and duplication of files, preferring a single file that the entire organizaton can use both for ongoing operations and future planning. Libraries also can make efficient use

of integrated systems. However, Edelhoff and Lehmann (1977) point out that this requires a rethinking of library operations and organization. They describe the conventional administrative system of libraries as one created by the experience of several hundred years, during which libraries were split into different and basically autonomous departments. Early experiments in automation tried to automate using this structure; but the cost and inefficiency of applying automation to conventional library organizations proved too great, and librarians were forced to conclude that library automation requires organizational change. In these authors' view, automation also is too costly to be carried out by individual libraries in isolation, without cooperative arrangements with other libraries to share hardware, software, databases, and bibliographic services.

Griese (1982) also recommends that libraries take advantage, wherever possible, of consumer-oriented databases which can be modified and avoid creating their own, because this approach will not only be more economical, but will result in libraries using systems designed for consumer use. These systems will be less complex and will also be capable of implementation on a variety of hardware systems. Dowlin (1984, p. 100) points out that over the life of a library computer system, the cost to purchase and develop software will be greater than the cost of the computer.

Resource sharing among libraries is not without problems, however. Hayes (1979) points out that libraries in networks often have conflicting priorities and that decisions that appear simple when one isolated library is involved can become exceedingly complex in a network environment. Costs of file conversion, equipment installation, and staff training may present difficulties because of the way that libraries' capital resources have already

been committed. The availability of funding also affects the rate of implementation of new technology, determines which functions will be implemented, and can result in irreconcilable conflicts within library networks. In addition, the libraries' users determine library service goals, and these may vary greatly among network members. Amon (1979) identifies the factors that inhibit library network development as including uncertainty and insecurity with respect to estimating costs and acquiring necessary funding and the fear of loss of status and control by personnel at participating libraries. Such reactions are common and, in the opinion of Amon, Fine (1979), and other experts, they deserve attention. Fine (p. 160) points out, however, that while technological problems in system design are the object of research and experiment leading to improved understanding, problems related to human behavior are treated simplistically and remain unresolved.

Taking Advantage of New Opportunities

Teletext and Videotex. While some types of viewtext are becoming relatively common in libraries, other applications are still in the experimental stages. Among these are teletext, videotex, and, in some areas, cable TV. To become involved in these technologies, libraries often must be willing to commit time and staff to pioneering research efforts.

Several libraries have participated in videotex and teletext experiments that are now concluded. For example, the Martin Luther King Library in Washington, DC, was the site of a teletext experiment in which the library, at no cost to the researchers, housed a terminal and provided library information for the system's programming. Public television station WETA and the Center for Understanding Media conducted the research. At the end of the experiment, the terminal was removed. A videotex system in Columbus, Ohio, also offered access to the library card catalog and allowed patrons to order books.

A number of useful findings have resulted from these research efforts. For example, Carey and Siegeltuch (1982), in their research report for the WETA experiment, point out that of the 10 public sites in which teletext terminals were located, the public library had the largest number of users. They attribute this to the fact that at the library, personnel were on hand to assist patrons who could not understand the system, while at other sites, users had to interact with the system alone. The researchers therefore recommend that such systems be placed where staff are to be available to assist patrons in their use.

Observation revealed that people expected the system to be self-explanatory, like a hand calculator; that few users resorted to the manuals provided for their assistance; and that users became frustrated by the long waiting intervals for accessing teletext frames. Based on these observations, the researchers also recommend that keypads used for systems accessible to the public have large keys with easily understandable labels. They also warn that teletext monitors need to be placed in secure locations, out of reach of vandals.

Great variation was noticed between younger and older patrons, the former being far more at ease with the technology. Also, women were less confident than men and preferred articles in the system's online magazine. Men preferred brief news articles on sports and current events.

Although the study of completed and ongoing experiments involving libraries can offer valuable insights, libraries need to be aware, as Tydeman (1982) points out, that the teletext and videotex experiments to date have been fragmented efforts, varying in the networks used, without display standards, and with a variety of services. Any individual library will need

to conduct its own research on user needs and functions to design and implement a system for its own users.

For example, costs for a teletext system in a public library such as the Martin Luther King Library were calculated to be $1,000 for equipment and installation, $250 yearly for maintenance, plus additional cost for electricity. If 6,250 to 12,500 users a year accessed the system, the cost was estimated to range from 4 to 6 cents per user. If the library provided a coin-operated system, a charge of 25 cents for three minutes was expected to cover expenses, not including, of course, any charge for the content presented on the system.

The South Florida Viewtron videotex system discussed in Case Study Report 8 offers a current example of cooperation between a library system and a videotex provider. The library responds online to reference questions and requests for books. This involvement with Viewtron creates no special burden for the library and increases awareness of library services among Viewtron subcribers.

Cable Television. Libraries that want to become involved in designing and implementing cable television programs have many models to follow, for school, academic, and public libraries in many areas of the country are tied into cable systems. Black (1981) points out that institutions need to begin by reviewing the franchise which the cable operator has with the local government. Often such a franchise provides for a free "drop" (an outlet for a TV set) to every school, college, or government building. Some franchises also require additional outlets in classrooms and charge only for the cable. Cable system operators also often offer non-commercial users other items, such as a channel of their own, production equipment, or a studio. The Shasta County Schools Media Center described in Case Study Report 4 offers an example

of cable cooperation with a school system. The cable franchise allowed this Media Center to become the site for a cable drop and provided the Center with additional equipment. The Center assists the cable company to meet its responsibility to provide public access to the community, and the school system extends its outreach to school districts and the community college. Costs of cable access will of course vary, depending upon the availability of support from the cable company and the extent of library involvement.

Libraries interested in cable must expect to become active in local politics and urge their elected local officials to write them into initial cable franchises or to consider their interests when existing franchises are renewed. To bolster these efforts, libraries often solicit support from local churches and civic groups. Cooley (1981) gives several examples of successful community efforts in including educational institutions and libraries in local cable systems.

Bibliographic Information Retrieval. Bibliographic Information Retrieval systems are in wide use in libraries. King, et al. (1981) report that many libraries are using OCLC's online computer cataloging and are providing access to large databases, such as The Source, Compuserve, DIALOG, SDC, BRS, NYTIS, and any of a number of the databases provided by the commercial vendors listed in Appendix B of this paper. Avram (1979, p. 223) points out that as of 1979 there already were over 2,000 institutions in the United States using computer-based utilities such as OCLC, Inc., the Washington Library Network, and RLIN.

However, Boaz (1982) reports that the use of automated systems in libraries is increasing very gradually, compared with business use. She points to a number of concerns that libraries face in integrating this technology. First, access to databases is expensive, and libraries must make

a decision as to whether the cost will be borne by the patron. In some libraries, as in the Minneapolis Public Library, discussed in Case Study Report 6, the patron pays the connect charges above a specified minimum. Libraries such as the University of North Carolina Library at Chapel Hill offer patrons online access, but have to charge them for all connect time. However, even libraries that charge for connect time often do not charge for staff assistance, and some libraries such as the Lorette Wilmot Library, discussed in Case Study Report 3, are reconsidering the economics of charging patrons for online searches.

A problem for libraries using shared online databases involves the locus of bibliographic control. Databases can easily become outdated, and they require constant monitoring to eliminate redundant material. Nevertheless, even with the problems that database searching presents, libraries such as the Lorette Wilmot Library at Nazareth College view this searching as a cost-effective extension of traditional reference service that provides immediate access to current data in dynamic fields and allows the user to specify information needs much more precisely (Matzek and Smith, 1980). Kilgour (in Edelhoff, 1977) points out that online systems make library professionals more productive and also enable them to respond to individual user needs, which has come to be very difficult to accomplish in large libraries where patrons receive individual help in less than five percent of uses.

Training in the use of BIR systems is critical to cost-effectiveness. Libraries such as the Minneapolis Public Library rely on vendor training. Other libraries feel that much more training is needed. Tenopir (1982) suggests that four half-day training sessions should be held over a one- or two-week period and that student searchers should be allowed sufficient online

time to refine their skills, so that patrons do not pay for inefficient or incorrectly done searches. Six months after the initial training, she suggests that a six-hour refresher course be given to improve search strategies and to deal with practical problems encountered. More complex strategies can be taught at this time to build on previous knowledge, rather than teaching these advanced strategies during the introductory course when they would be difficult and confusing. This description of the training required to ensure that searchers can use databases effectively points to the potential costs involved in training library personnel in online search strategies.

An example of a widely used bibliographic information retrieval system is OCLC, which now is a not-for-profit membership organization. From 1967-1971, its activities were supported by membership fees of income-tax-exempt institutions in the State of Ohio that included institutions of higher education, public libraries, public school systems, hospital libraries, and such other institutions as Chemical Abstracts Service. The OCLC network extends across the United States and into Canada. Kilgour calls OCLC a 20th Century, cooperatively shared cataloging system. Its developers consider the two principal objectives of online computerized library networks to be: 1) to make available resources in network libraries to individual users at individual libraries and 2) to reduce the cost of libraries. Over 6,000 libraries worldwide use OCLC services, and 22 regional networks contract with OCLC for their member libraries. Member libraries use four online subsystems: 1) shared cataloging, 2) serials control, 3) acquisitions, and 4) interlibrary loan. OCLC's shared cataloging feature allows member libraries to share the labor costs and other costs associated with the

development of a union catalog. Only one library prepares the original catalog entry for an item and the location of each item cataloged is indicated by location symbols to facilitate interlibrary loan (OCLC, 1983).

Access to commercial databases has various effects. Lancaster and Goldhar (1981) report that a survey of academic and special libraries revealed significant levels of cancellation of subscriptions to publications equivalent to similar ones online. However, Nazareth College reported a significant increase in subscriptions purchased, as patrons identified available journals.

Cartridges, Cassettes, and Discs. Materials in these formats are in common use in libraries, as dedicated word processors and small computers that can support data processing, graphics, and telecommunications become widely available. A variety of software packages have been designed for library applications; and many general purpose software packages, such as spreadsheets, also are adaptable for library use. Libraries with limited budgets need to select software with considerable care, however. Reviews of available software for library use are published in library and education literature. Presentations related to state-of-the-art materials also are a staple of library and media conferences at the local, state, and national levels; and state education and library agencies sponsor many informational activities for the purpose of introducting these technologies. Videodiscs also are being used in some libraries and, as the equipment becomes more widely available, they will provide a useful storage medium, since as Dowlin (1984, p. 93) points out, when the laser videodisc achieves its potential, it will be able to store up to a billion bytes of information on one disc.

Design/Implementation Examples.

Peterson (1983) describes a model used in the sucessful design and implementation of a program that introduced viewtext into a high school

library media center, beginning with disc formats and progressing towards the integration of online services.

The school staff began by developing an understanding of microcomputer use in the school district and within the school to assess the level of administrative support they could expect and to determine how much knowledge of such technology already existed. They then developed a list of the administrative and educational tasks library personnel and their clients would like to accomplish using the computer. Tasks identified were concerned both with library management and patron needs relative to word processing, material checkouts and overdues management, creation of bibliographies and an annotated nonprint catalog, budget development, materials ordering and processing, creation of an electronic card catalog, and student media skills instruction.

Hardware and software options were reviewed with these requirements in mind. Options of greatest interest then were reviewed again in terms of compatibility with other computers in the school and district. Expandability was considered, as were interfaces with appropriate printers and other peripherals. Vendors were evaluated in terms of their prices and service, and computer users in other schools were consulted about relevant experiences.

The system design configuration that resulted conformed to the first stage suggested by Goldhar. The school described now is performing the original media center administrative tasks more efficiently. However, it also is already in stage two, to the extent of having staff that can use the computer to develop an inventory record of 2,000 paperback titles and provide two labels for each title, with accession numbers assigned by the computer. The school is considering stage three activities as well, in the form of developing linkages with large online databases. The Gaithersburg High School

Media Center described in Case Study Report 1 provides another example of integrating disc format software into a media center program.

A similar adoption process in an academic environment is described by Veaner (1977) relative to the implementaton of library automation through BALLOTS. BALLOTS (now RLIN) is an integrated system that follows a book from selection to the shelf. It is implemented through a regional network in California and other western states. Those who developed it suggest that five factors influenced its acceptance and consequent success: 1) involvement of all staff at all levels of design and implementation; 2) removal of any threat of worker unemployment due to automation; 3) gradual introduction, so that the pace of change was not too great; 4) vigorous procedures to produce a reliable system that cannot destroy any professional's intellectual work; and 5) selection and installation of a system whose positive benefits can be seen readily by the staff.

Some of the social implications of the wide use of viewtext which are important to libraries and the communities they serve are discussed in Chapter VIII.

VIII. SOCIAL IMPLICATIONS

There is broad consensus that the United States has entered into a post-industrial society, which Kuhns (1982) refers to as an "information culture" (p. 53). He characterizes the industrial revolution as having acted on the physical world to create material goods. The information revolution in which we are now involved will, he says, act on the senses, our psyches, and our collective knowledge.

The NCLIS Report to the President on National Information Policy (1976) identifies a number of characteristics of information technologies that affect and change the environment in which libraries presently operate. These include:

1. the exponential growth in the volume of information;
2. the ability of telecommunications to shrink time and distance, providing instantaneous communication of information at any location; and
3. the dependence on such communication that is already developing, as securities dealers, savings banks, etc., begin to provide services online (p. 5).

The potential social implications of viewtext are dramatic and can be expected to affect every important area of our society. The literature and discussions with experts indicate that the availability of viewtext will affect, among other areas, work, family life, education, leisure, equity of access to information, crime, politics, and human rights. In the present study, it is not possible to discuss all of the implications of viewtext or, indeed, to discuss any in depth. However, some of those which appear to have serious consequences for libraries will be identified briefly in this section.

Work

Research by the Congressional Office of Technology Assessment (OTA) (1982) indicates that many workers in our economy already are affected by viewtext and that many more will be affected in the future. Indeed, the National Bureau of Standards (NBS) has built a "factory of the future" which is driven by elaborate computer programs. This experimental facility is not a laboratory prototype, according to NBS, but integrates computers and television cameras that already are commercially available. Schrage (1983, p. D3) says that the use of such facilities has the potential for eliminating two million jobs by 1990 and that such automation will replace three times as many workers as it will provide with new jobs.

Weizenbaum, of the Massachusetts Institute of Technology, a leading expert on computers, asks serious questions about whether such initiatives constitute a "Faustian bargain," in which we have traded work for leisure, but have not faced the problem of providing a means of support for those who used to be workers (1983, p. 60). Studies of the social costs and benefits of the new technologies such as the Harvard University conference, "Human Management Futures" (Stone, 1983), are ongoing. Library professionals must be involved in such discussions if they are to understand and respond to the needs of their clients and identify appropriate roles for their institutions.

The work of the library patron, as well as the work of library personnel, will be affected by changes brought about by viewtext. Vondran (1983), of the Catholic University of America School of Library and Information Science, points out that his school and other similar schools have revised their curricula to integrate instruction in online database searching, with particular emphasis on the specific databases that are relevant to librarians

who are planning careers or pursuing addi[illegible]education to enable them to work in school media centers, medical, [illegible]emic, and government libraries.

Automation in libraries also will a[illegible]rs at lower skill levels, for computers are being used in businesses t[illegible]rol robots that unload and shelve inventory and handle orders and payments (Cornish, 1981). It seems likely that libraries also will have to take advantage of these features for specific labor-intensive unskilled library work.

Placement assistance for employees idled by automation represents a challenge to society. Libraries are one source of information available to citizens seeking information on jobs and careers. Indeed, the Pikes Peak Library, as noted previously, already offers an online job information service; and job information was included as a feature of the Washington, DC teletext experiment.

Family Life

Futurists such as Toffler (1980) have said that as telecommunications become more accepted, many workers may work at home, either as independent businesspersons or by telecommunicating online with their workplaces. This phenomenon is expected to have several important social effects. One effect may be that parents working at home will be able to spend more time with children and other family members, and the problem of daycare both for children and older people may be less severe.

Researchers disagree about prospects for libraries in such situations. Snider (in Badzik, 1982, p. 128) thinks that in the future libraries will be simply relay stations, transferring information to home terminals from large databases. On the other hand, Badzik (1982) foresees this enforced contact brought about by working at home as not only improving communications in families, but also as creating tension and increasing the need for escape from

the constant confinement of such settings. He quotes Emard, Vice President of Online, Inc., (Badzik, p. 128) as saying that information available online in the home is not likely to replace libraries for this reason. Emard thinks that the role of libraries will be augmented as they become not only local access centers that serve information needs, but places offering companionship, as a tavern does, to people working alone or in secluded family groups.

Not all experts think that workers in large numbers will work at home, however. Meyer (1983), for example, thinks that human contact is important in almost all jobs and that very few could be done by workers at home. Technical problems also preclude communications taking place between conventional workplace mainframe computers and home computers.

Badzik tells us (1982) that research on videotex in the experiment carried out by OCLC and BancOne in Columbus, Ohio, showed that the effect of videotex availability on family life varied from one home to another. In this study, 15 percent of subjects said they actually watched less television programming during the time they had videotex terminals in their homes, and 8 percent said they talked more with their children as a result of the experiment.

Other types of adjustments to the availability of viewtext also are anticipated. Emard sees families who can work online as likely to move from congested urban areas to more rural areas, which have in recent years been deserted, as the preeminence of occupations in agriculture declined and it was no longer possible to earn a livelihood in a small town. He thinks that young people who need housing will flee from high-priced urban real estate to less expensive locations, where they can work from home and pay more reasonable housing costs. Large-city libraries may lose patrons, if this phenomenon takes hold; and cities may increasingly lose their tax base, from which

library support comes. On the other hand, rural libraries may experience an increase in patronage and may be required to provide much more sophisticated services than they have in the past. The data presented in the Case Study Reports show that large-city libraries are, in fact, losing patrons to suburban libraries and that rural libraries at this time are suffering from severe funding limitations.

Education

At the same time that many industrial workers are losing their jobs as a result of automation, OTA points to a shortage of workers in such specialties as computer science, engineering, and the retraining of adult workers. OTA also found that a large number of people are functionally illiterate and warned that they will be even less able to function in the information society of the future. OTA suggests that Congress may have to address the nation's literacy problems. NCLIS (1982, p. 53) also recognizes illiteracy as a serious problem and has encouraged the involvement of the library community in its eradication.

In addition to improving the levels of literacy in reading, libraries also can contribute to patrons' education in computer literacy. The Washington, DC area teletext experiment revealed a number of findings that have broad social implications in regard to the need for citizens to become more familiar with new technologies in non-threatening and helpful environments (Carey and Siegeltuch, 1982). The researchers conclude that the public will need a great deal of assistance, over a long period of time, to gain reasonable skills in using terminals. They suggest that a keypad system such as that used in their experiment might be a good introduction for the general public in accessing information through a terminal. They stress the need for human assistance, observing that when users received help in understanding and using the system,

they would persist in attempting to access information; but at sites where human help was not available, users were quickly discouraged. Printed manuals did not appear to be helpful to most users, many of whom were poor readers or had vision impairments. This finding suggests that library professionals will be needed to help people use viewtext, even if direct access to systems by users is available.

In the above study, teletext decoders were placed in 40 homes and 10 public locations, including the Martin Luther King Library. The researchers monitored 12,000 user sessions over a 12-month period. They found great discrepancies in the ability of different groups to cope effectively with the system. Men were much more able to use the system than women, and people between the ages of 10 and 30 were the most comfortable with the technology. These results seem to indicate that older people and women are least comfortable with the electronic technologies that are in wide use in our society. The December 1983 issue of Interface Age, a computer publication for business, confirms this finding, saying that women are not getting their fair share of jobs and income in computer-oriented fields.

Another finding of interest to libraries is that, of those persons involved in the Washington, DC teletext experiment who said they would pay $200 for a decoder to receive teletext at home, most were not regular library users. Overall, they were light-to-moderate readers of newspapers and magazines, but were heavy users of television and often owners of video games. Blue-collar workers and black consumers in households with incomes of $10,000 to $20,000 were most enthusiastic about the experimental system. If this is a consistent finding, viewtext will have wide appeal to a group that libraries are not now serving, but who could be patrons of online library services. However, the Viewtron experience shows that households in this

income bracket do not actually subscribe to videotex service, probably because of its high initial and ongoing costs.

The researchers in the Washington, DC study were extremely concerned that the design and manufacturing of decoders for the system are being based mainly on engineering considerations. In their view, the lack of concern with user requirements will make the equipment obsolete very quickly. This opinion reinforces those of other researchers and suggests that libraries must be involved as advocates for users in the design and implementation of systems. Indeed, the Viewtron videotex providers in South Florida already have had complaints about the Sceptre keyboard and are planning to redesign it to meet human factor requirements, as Case Study Report 8 indicates.

OTA also concludes that, in the field of education, the information revolution has changed the nature of what needs to be learned, and by whom; who will provide the instruction, and how; and who will pay for it. It concludes that information technology can improve and enrich traditional education and can distribute education to new environments, such as homes and offices. If, as Emard predicts, families move to remote areas and work at home on terminals, dependence on online education also may become commonplace. Indeed, one of the popular offerings in the Viewtron system is an online Scholastic Aptitude Test (SAT) practice module, which students can use with their home TV sets. If students no longer congregate in schools, however, certain aspects of the school systems will change. Universities will not need dormitories, lunchrooms, recreational facilities, or libraries as we have known them. Instead, courses in all subject areas will be available to students wherever they are and whatever their background. This shift will continue a trend already well established, as reflected in a Washington Post article of August 12, 1982, which reports that during the 1981-82 school year,

555 colleges offered television courses to 50,000 students. The same paper reported on April 4, 1982, that online courses also are proliferating, with the advent of the "Electronic University," developed by TeleLearning Systems, Inc., of California, which is offering courses both for academic credit and without credit to home computer owners. Lectures and electronic workbooks are distributed on floppy discs and supplemental textbooks also are provided. Students can communicate with instructors via electronic mail or online. Although the system seems impersonal, instructors say they know students well because each student submits a biography and course goals which make it easy for teachers to relate to students they never see.

Simons (1981) says that in our age we are undergoing a shift in the monopoly of knowledge by schools and the professions, for in contemporary society anyone can control and access the knowledge available through the electronic media. But Marvin (1982) cautions that information does not translate easily into understanding. He believes that the electronic technologies have only dramatically increased the complexity of our society. He feels that more information is indeed available to everyone, but the result has been to make it more difficult for the individual to analyze the information available and use it to make decisions. Marvin fears that although everyone can now access more information, much less of it is meaningful.

Moore (1981) points out, however, that children who are exposed from infancy to environments where telecommunications are in common use may have far less difficulty in using online information. They will be very experienced in information searching. Their competence to perform in adult occupations may even bring about a rethinking of present attitudes toward

children, which presume children to be inferior to adults in strength, ability, and experience.

Leisure

The effect of viewtext on library materials that are recreational in nature may be less immediate than effects on research materials. Lancaster (1981) feels that recreational reading will continue to appear in print formats for many years. However, OCLC researchers predict that printed materials will play a diminishing role in the provision of some information. They see print materials as well suited to long-term storage, but feel that the rapid delivery and updating of information available online offers a communication technology that is topical and timely, and thus more appropriate for meeting contemporary needs for information.

Viewtext continually offers new competition for recreational reading time, however. For example, reading can be done simultaneously with listening to phonograph records, but it is less likely that readers can simultaneously watch videorecords, which provide unusual eye-catching visual concepts as well as music. At first videorecords were broadcast only on cable; but, recently they have been released on videodiscs and videocassettes for home buyers (Egan, 1983).

Johnson (in Badzik, p. 130) foresees newspapers as becoming smaller and less detailed as a result of the availability of news online. This is not a unanimous view, however. Badzik also quotes comments by Knight-Ridder's Dozier to the effect that news reports online will be so abbreviated that they will draw users to newspapers to read the full story. Barrell (1981), of the Library of Congress, agrees. He thinks that print media and videotex have different markets and will not compete for the same users or purposes.

Simons (1981) feels that newspapers and books will not be replaced by viewtext and that people may soon tire of reading headlines on their terminals. To bolster this prediction, he observes that live entertainment was not replaced by television, reading by radios, nor letter writing by telephones. New technologies incorporate other existing forms of communication resources rather than replace any one of them. Nevertheless, television has affected movie attendance, and the telephone is a more common communications medium for most people than letter writing, especially where timeliness of information is critical. The Source reports, in fact, that electronic mail is its most popular service (Adams and Adams 1982).

Access to Information

A serious social concern is the question of who will pay for online information services and how much? Brown (in Badzik, p. 129) thinks that many people who access information from the large databases available will be people who will not use traditional libraries. He sees the Library of Congress and other libraries as furnishing the information for online collections, but is concerned that the cost of access to the user will become prohibitive as telephone charges increase and databases grow more complex, longer, and more numerous. Identification of the best source for the information needed will be difficult and expensive for the untrained user, and intermediaries may become essential. Fetheroff (1982) raises the fear, however, that only the rich will be able to afford the services of such information specialists. She says that this already is becoming apparent, for up to the present, most individuals have found the cost of videotex prohibitive. Where it is available, it is mainly used by businesses and a few wealthy individuals.

Thompson (1983) feels that eventually those publishers that now make their publications available in hardcopy as well as online will lose their hardcopy market, as Lancaster (1981) found is already happening. They then will begin to introduce charges for providing publications online, and information access may become too expensive for many people.

Libraries need to make their publics aware that adequate funding is critical if information access for all is to be a reality. Power (1983) says that access to computers in schools already is inequitable, since 80 percent of the nation's 2000 largest, richest high schools own computers, while only 40 percent of the smallest, poorest ones do. Examples of libraries that are suffering from the economic recession in their communities are numerous. The Detroit Public Library, for example, in December 1983 sent an appeal to Friends of Libraries USA, describing its financial crisis and asking for help. In the letter to the Friends, the Library said its staff had shrunk from 800 to 378; 6 of 30 branches had been closed; and 22 were on half-time schedules, with five departments eliminated, including Rare Books, School Services, and Film and Program Services (Uptown Citizen, p. 26.).

The costs of computers are substantial. Barrette (1981) reports that the average cost of a library microcomputer system is $1,000 and suggests that to provide each student now in school with an average of 20 minutes of individual computer access time daily would require 25 times as many systems as now exist in schools. In a school with 500 students, for example, he estimates that 42 microcomputers would be required to ensure this level of student access. His model supposes a staff of 20 teachers, one media specialist, and seven 50-minute class periods each day. He cautions that this level of involvement will require adequate funding at the state level to provide for staff development and equitable access.

Meilach (1983) points out that if libraries cannot pay for technical specialists, these professionals will look for opportunities in other fields. In her article on women computer users, she describes the experience of one librarian who was put on a part-time schedule because of library cuts. Since she had learned how to tap into databases, she can offer a private information service. Her clients include physicians and engineers for whom, she says, she can get information in one-tenth of the time they would take on their own. She also teaches a course in electronic research in the time that has been cut from her library work-week.

Crime

The FCC requires that the telephone company be notified when a modem is installed; but, there is no control over its use, and Foulks (1983) reports that paranoia among public, private, and governmental database managers regarding the possibility of break-ins is widespread. Large commercial databases require the use of a password and account number, which can be changed regularly. But crimes involving the invasion of databases and the illegal use of other people's accounts are expected to multiply, as thousands of businesses and hobbyists log onto online services from telephones at any location. Databases such as CompuServe warn users to be alert when online, responding with passwords only when they are sure a system prompt is asking for them. Government Computer News (1984, p. 14) recently described the focus of a forum on videotex as "the ungovernable topic of unauthorized access."

The piracy of computer software also has become common and difficult or impossible to regulate. Shannon (1982) says that software developers could lower costs and produce more software if they did not need to protect their products from illegal copying. According to Shannon, educators are some of the worst offenders. In defense of software users, however, Shannon points

out that businesses often have a legitimate need to have back-up copies of expensive copyrighted software programs that contain inventory, payroll, and other critical business data. Teachers, too, have legitimate concerns about letting small children use the only available copy of an expensive software program.

The library community can expect this issue to become critical for them as they begin to loan software and videotapes. They will have to appeal to users' self interests and make clear the relationships between copyright guidelines and the cost and availability of software. They also need to be involved in ongoing discussions of software duplication policies.

Politics

Viewtext has political implications. Viewers can be polled and data collected and instantly tabulated. Special interest groups can develop marketing lists, send form letters, and organize supporters online. Access to such online information might make libraries essential resources, especially to many public interest and voluntary organizations.

Viewtext has the potential to become a tool for political control, however, if concentrated in the hands of a powerful few (Fetheroff, 1981). It is obvious that access to databases that contain information on health, credit ratings, etc., has the potential for great abuse. However, all databases have some risk. Boormin and Levitt (1983) offer an example of a threat to individual privacy and security from the unprincipled use of a complex computer "block" model that exploits masses of non-sensitive relational data collected about groups of individuals. Their example shows that even seemingly innocuous data allows individuals to be identified as being in communication with other individuals or active in certain areas. When individuals are considered by management to be in communication with

unreliable or uncooperative elements, those so associated can be slated for dismissal or denied legitimate career opportunities. The authors suggest that the true threat in such systems lies not in the computer model itself, but in our society's slowness to react.

Another situation that has provoked controversy in regard to the use of data results from the suggestion that, to be maximally useful, Internal Revenue Service and Census information that is held in government databases should be shared by other agencies which now duplicate the collection of similar data for separate studies. Such use traditionally has been forbidden by law. Critics warn that if citizens perceive that Census information is being used for other than census-taking, they will be reluctant to provide it, which might have the ironic effect of saving Federal funds for some agencies, while degrading the quality of shared Census data.

The social implications discussed above are but a few of those of the most obvious relevance to libraries, but they indicate a need for library involvement and vigilance in the interests both of themselves and their patrons.

IX. CONCLUSION

The literature reviewed and the experts consulted concur in the opinion that the role libraries take in the provision and delivery of viewtext will be critical to the survival of the library as an institution in American society. There also is broad agreement that the decision by any library to become involved with viewtext is certain to modify its provision of traditional services.

Critics of libraries point out that libraries as information providers can be supplanted by online commercial information databases. These commercial resources have an advantage over libraries in that they can charge clients for information. Libraries, by contrast, often must carry out their role as information providers within very constraining budgetary limitations. If the libraries become providers of online services, they will, in most instances, need to curtail other program areas.

However, commercial databases do not serve clients in the sense that libraries do. Vavrek (1982) points out that the role of the library is a unique one, for no other information provider creates a balanced collection of information from all sources and viewpoints, makes them available to patrons at no profit to the library, and provides experts to help patrons to access and use them.

The value of libraries as information resources depends very much upon their providing and delivering accurate and timely information, and often the bibliographic citations retrieved through online databases identify materials in existing library collections. The ability of many libraries to provide correct information, however, is likely to be compromised unless funding and

resources to support libraries are adequate, and unless appropriate viewtext applications are available in libraries.

Libraries are being forced to reassess their organizational structures, their services, and the adequacy of their information resources. Society also must reassess its commitment to its libraries, for even the most severe critics of contemporary libraries agree that most libraries lack the staff and the fiscal resources to expand substantially their involvement with viewtext.

APPENDIX A: BIBLIOGRAPHY

To facilitate the use of this bibliography, entries are organized into the following categories: 1) the Role of Libraries in an Information-Based Society; 2) Legislation/Regulations; 3) Technical Aspects of Viewtext; 4) Status of Viewtext Information Services; 5) Current Library Applications of Viewtext; 6) Design, Implementation, and Maintenance of Viewtext in Libraries; and 7) Social Implications. The types of references included under each category are described below.

1) The Role of Libraries in an Information-Based Society - includes references on the evolving role of libraries.

2) Legislation/Regulations - includes actual legislation and regulation citations as well as references that discuss issues related to their implementation.

3) Technical Aspects of Viewtext - includes references that explain the technical design and operation of the viewtext technologies.

4) Status of Viewtext Information Services - includes citations related to the latest developments in the key viewtext areas: videotex; teletext; bibliographic information retrieval; and cartridge, cassette, or disc format; and their applications in education, business, and the community.

5) Current Applications in Libraries - includes references to literature on how the various technologies are being used in public, school, academic, and special library settings.

6) Design, Implementation, and Maintenance of Viewtext in Libraries - includes references that describe how to plan, maintain, implement, and evaluate the effectiveness of viewtext systems.

7) Social Implications - includes citations related to effects viewtext will have on the society.

While the information in many references addresses several of the research categories, each reference is listed only once, under the category to which it is most immediately related.

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APPENDIX B: SOME MAJOR BUSINESSES DELIVERING REMOTE ELECTRONIC ACCESS TO DELIVERY OF INFORMATION (READI)

AT&T Picturephone Meeting Service
Bedminster, NJ 07921
(201) 234-7879

Bibliographic Retrieval Services
1200 Route 7
Latham, NY 12110
(800) 833-4707

CapCon Library Network
702 H St., NW, Suite 401
Washington, DC 20001
(202) 628-9644

CBS Extravision
CBS Television
51 West 52nd St.
New York, NY 10019
(212) 975-3887

Chemical Bank of New York
100 World Trade Center
756 Broadway
New York, NY
(212) 820-5739

Comet
Computer Corporation of America
675 Massachusetts Ave.
Cambridge, MA 02139
(617) 492-8860

CompuServe Information Service
5000 Arlington Centre Blvd.
P.O. Box 20212
Columbus, OH 43220
(800) 848-8990

Comp-U-Store
777 Summer St.
Stamford, CT 06901
(800) 243-9000

DELPHI
General Videotex Corporation
3 Blackstone Ave.
Cambridge, MA 02139
(617) 491-3393

Dialcom
1009 Spring St.
Silver Spring, MD 20910
(301) 588-1572

DIALOG Information Services, Inc.
3460 Hillview Ave.
Palo Alto, CA 94304
(800) 982-5838 in California
(800) 227-1927 in other states and Canada

Dow Jones News Retrieval Service
P.O. Box 300
Princeton, NJ 08540
(609) 452-1511 in New Jersey
(800) 257-5114 in other states and Canada

"Electronic Mail & Message Systems" (EMMS)
International Resource Development, Inc.
30 High St.
Norwalk, CT 06851
(203) 866-6914

Geac Computers International
350 Steelcase Rd. West
Markham, Ont.
Canada L3R 1B3
(416) 475-0525

General Electric Company
GESCAN Marketing
Military and Data Systems Operations
1755 Jefferson Davis Highway
Arlington, VA 22202
(703) 979-6000

Graphnet Inc.
Telemarketing Department
8230 Boone Blvd., Suite 330
Vienna, VA 22180
(800) 336-3729
(703) 556-9397 in Virginia

TextScan
ISA, Incorporated
Information Systems Architects
5825 Grosvenor Lane
Bethesda, MD 20814
(301) 530-5326

ITT World Communications, Inc.
67 Broad St.
New York, NY 10004
(212) 797-7522

Infomart
164 Merton St.
Toronto, Ontario M 4S 3A8
Canada
(416) 489-6640

The Information Bank
1719 A Route 100
Parsippany, NJ 07054
(201) 539-5850

Logica, Inc.
666 3rd Ave.
New York, NY 10017
(212) 599-0828

Mead Data Central
Mead Corporation
9333 Springboro Pike
Dayton, OH 45401
(513) 859-1611

Media General Financial Services, Inc.
P.O. Box C-32333
Richmond, VA 23293
(804) 649-6587

Medical Information
GTE Telenet
8229 Boone Blvd.
Vienna, VA 22180
(703) 829-9565

Metronet
228 Metro Square Bldg.
7th and Roberts Sts.
St. Paul, MN 55101
(612) 224-4801

NSPI Journal, December 1983
Contains a complete listing of businesses involved in developing videodiscs. Available from:
The National Society for Performance and Instruction
1126 16th St., NW, Suite 315
(202) 861-0777

New York Times Information Service (NYTIS)
1719A - Route 10
Parsippany, NJ 07054
(201) 539-5850

NewsNet
945 Haverford Rd.
Bryn Mawr, PA 19010
(800) 345-1301
(215) 527-8030

J.A. Cambron Co., Inc.
The On-Line Computer Telephone Directory
P.O. Box 10005
Kansas City, MO 64111
(816) 756-1847

OCLC Online Computer Library Center, Inc.
5656 Frantz, Rd.
Dublin, O 43017-0702
(614) 764-6000

ORBIT
SDC Search Service
2500 Colorado Ave.
Santa Monica, CA 90406
(800) 352-6689 in California
(800) 421-7229 in other states and Canada

RCA Global Communications, Inc.
60 Broad St.
New York, NY 10004
(212) 806-7000

The Source
1616 Anderson Rd.
McLean, VA 221202
(800) 336-3300
(703) 734-7540 in Virginia

Speedi Telex International
3400 Peachtree Rd., N.E.
Atlanta, GA 30320
(800) 241-1913

Systemhouse
9000 Main St., Suite 401
Fairfax, VA 22031
(703) 276-0500

TRT Telecommunications Corp.
1747 Pennsylvania Ave., N.W.
Washington, DC 20006
(202) 862-4556

Telemail
GTE Telenet
8229 Boone Blvd.
Vienna, VA 22180
(703) 827-9565

Text Scan Division
ISA, Incorporated
5835 Grosvenor Lane
Bethesda, MD 20814
(301) 530-5326

Tymnet, Inc.
20665 Valley Green Dr.
Cupertino, CA 95014
(408) 446-7000

Tymshare, Inc.
20705 Valley Green Dr.
Cupertino, CA 95014
(408) 446-6236

Viewdata Corporation of America
7th Floor
1111 Lincoln Road
Miami Beach, FL 33139
(305) 674-1444

Vu-text
P.O. Box 8558
Philadelphia, PA 19101
(215) 854-8297

Western Union International
Facsimile Bureau Service
One WUI Plaza
New York, NY 10004
(212) 509-1899
(212) 509-1852

Additional Information

The listing of businesses provided above is not exhaustive, but represents major providers of READI at the time of this writing. Libraries can enlarge and update information on sources of READI by reviewing current editions of the following reference works:

Directory of Online Databases
Cuadra Associates, Inc.
2001 Wilshire Blvd., Suite 305
Santa Monica, CA 90403

Information Industry Market Place
R.R. Bowker and Company
1180 Sixth Avenue
New York, NY 10036

Encyclopedia of Information Systems and Services
Gale Research Company
Book Tower
Detroit, MI 48226

Computer-Readable Databases: A Directory and Data Sourcebook
Knowlege Industry Publications, Inc.
701 Winchester Ave.
White Plains, NY 10604

Datapro Directory of On-Line Services
Datapro Research Corporation
1805 Underwood Boulevard
Delray, NJ 08075

Online and Database
Online, Inc.
11 Tannery Lane
Weston, CT 06883

Other Networks
P.O. Box 14066
Philadelphia, PA 19123

"VideoPrint"
International Resource Development, Inc.
30 High St.
Norwalk, CT 06851

APPENDIX C: LIST OF LIBRARIES PROVIDING VIEWTEXT

SCHOOL LIBRARIES/MEDIA CENTERS

Shasta County Schools Media Center
Shasta County Superintendent of Schools Office
1644 Magnolia St.
Reading, CA 96001
Contact: Jackie Martin
(916) 244-4600

Alexis I. DuPont School District Media Centers
50 Hillside Rd.
Greenville, DE 19807
Contact: Helen Hollinger
(302) 736-4667

Cape Coral High School Library
2300 Santa Barbara Blvd.
Cape Coral, FL 33914
Contact: Harriet Mattaz, Librarian
(813) 574-6766

Gulf Elementary School Library
3400 W. 17th Pl.
Cape Coral, FL 33914
Contact: Alison Lutz
(813) 549-2726

Urbana School District 116 Libraries
1602 South Anderson
Urbana, IL 61801
Contact: Larry Johnson
(217) 384-3636

Harrisburg School District 3 Libraries
40 South Main Street
Harrisburg, IL 62946
Contact: Margaret Moore
(618) 253-7637

Riverside-Brookfield District 208 Libraries
Ridgewood and Golf Road
Riverside, IL 60546
Contact: Dawn Heller
(312) 442-7500

Park Ridge School District 64 Libraries
164 South Prospect Avenue
Park Ridge, IL 60068
Contact: Ray Bouma
(312) 399-7300

Northfield High School District 225 Libraries
1835 Landwehr Road
Glenview, IL 60025
Contact: Jerry Wicks
(312) 729-2000

Quincy School District 172 Libraries
1444 Maine Street
Quincy, IL 62301
Contact: Don Blattner
(217) 223-8700

Bunker Hill School District 8 Libraries
Box Y, 504 E. Warren
Bunker Hill, IL 62014
Contact: Ron Hutson
(618) 585-3116

Dakota School District 201 Libraries
Dakota, IL 61018
Contact: Eric Anderson
(815) 449-2832

Edgelea Elementary School Library
2910 South 18th St.
Lafayette, IN 47907
Contact: Anabelle Newton
(317) 448-4640

Gaithersburg High School Library-Media Center
314 So. Frederick, Ave.
Gaithersburg, MD
Contact: Linda Crump
(301) 926-1920

Bertha Hewitt/Clarissa School District Libraries
8855 Inwood Ave.
So. Cottage Grove, MN 55016
Contact: Charles Johnson
(615) 459-2535

Braham School District Libraries
Rte 3, Box 350
Cambridge, MN 55008
Contact: Will Kitchen
(612) 689-2162

Eagle Bend School District Libraries
Box K
Eagle Bend, MN 56446
Contact: Richard Lundgren
(218) 738-6442

T. C. Williams High School Library
3330 King St.
Alexandria, VA 22302
Contact: Gloria Davidson
(703) 998-2060

PUBLIC LIBRARIES

Pikes Peak Library District
P.O. Box 1579
Colorado Spring, CO 80901
Contact: Kenneth Dowlin
(303) 471-2255

Dade County Public Library
1 Biscayne Blvd.
Miami, FL 33132
Contact: Micki Carden
(305) 579-5005

Broward County Public Library
P.O. Box 5463
Ft. Lauderdale, Florida 33064
Contact: Donna Gruleman
(305) 765-5463

Cloquet Public Library
406 Cloquet Ave.
Cloquet, MN 55720
Contact: Mary Lukkarila
(218) 879-1531

Minneapolis Public Library
300 Nicollet Mall
Minneapolis, MN 55401
Contact: Betty Fugazzi
(612) 372-6607

East Meadow Public Library
Front St. and East Meadow Ave.
East Meadow, NY 11154
Contact: Norman Seldes
(516) 794-2570

Harborfield Public Library
31 Broadway
Greenlawn, NY 11740
Contact: Trudy Brown
(516) 757-4200

Plainedge Public Library
1060 Hickville Rd.
Massapequa, NY 11758
Contact: Joe Eisner
(516) 735-4133

ACADEMIC LIBRARIES

American University Library
4400 Massachusetts Avenue, N.W.
Washington, DC 20016
Contact: Donald D. Dennis
(202) 686-2323

Center for Education Research and Development
University of Maryland Baltimore County
Catonsville, MD 21228
(301) 279-3494

Fondren Library
Rice University
Woodson Research Center
Houston, TX 77251
Contact: Nancy Booth Parker
(713) 527-8101

Lorette - Wilmot Library
Nazareth College of Rochester
4245 East Ave.
Rochester, NY 14610
Contact: Scott Smith
(716) 586-2525

Massachusetts Institute of Technology Library
Cambridge, MA 02139
Contact: Jay Lucker
(617) 253-1000

Mullen Library
Catholic University of America
Washington, DC 20064
Contact: Adele Chwalek
(202) 253-1000

University of Florida Libraries
Gainesville, FL 32611
Contact: Sam Gowan
(904) 392-0341

University of Illinois Library
Urbana, IL 61801
Contact: Nancy Anderson, Barton Clark, Bill Mischo
(217) 333-0258, 333-0317, 333-3576