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Developing a user-cordial online retrieval model strategy to access Extension educational materials from a north central region database

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Developing a user-cordial online retrieval model strategy to access Extension educational materials from a north central region database

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CHAPTER I: INTRODUCTION

Introduction

The Cooperative Extension Service system was originally designed to make available the knowledge and research generated within land-grant institutions to those individuals not directly attending universities, throughout their lives (Rasmussen, 1989). The tasks performed by the Cooperative Extension Service (CES) then and now fall into three general categories: information delivery, educational delivery and problem solving (Electronic Technology Task Force, 1985). Today CES is striving to meet the needs of a rapidly evolving information landscape.

One of Extension's earliest attempts to coordinate information beyond state lines using computer technology was the establishment of the North Central Region Educational Materials Project (NCREMP) in 1976. NCREMP was developed to facilitate communication and awareness regarding Extension educational resources among the states that make up the north central region[1]. Its purpose was and is to eliminate the artificial borders between states when Extension staff need to locate or develop materials used in satisfying their clients. A bibliographic database containing references to educational materials produced by Extension specialists from the north central states, is maintained at Iowa State University to centralize information on these resources. As computer technology and staff experience progressed, the database was transferred to a microcomputer housed in the NCREMP office. To expedite data entry and search processing, a local area network was installed.

Search requests from anyone affiliated with these land-grant universities are processed at no charge, as NCREMP is funded by the Extension Services of north central states. The user sends a brief description of the topic to be searched, either by mail, telephone or fax, and NCREMP office personnel use appropriate keyword associations to generate a list of references

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[1] Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin

relating to the topic. A hard copy is then sent to the user which lists title, author, abstract, producing university, and format, with instructions on obtaining copies.

To further refine the procedure whereby an Extension staff person may acquire information concerning items in the NCREMP database, a user-cordial search model has been designed which allows Extension staff to electronically search the NCREMP database directly from a personal computer, rather than have NCREMP office staff process the request. Criteria evaluated to ensure ease of use of the search procedure were reviewed, with recommendations given for further refinement of the system. Attitudes among Extension staff regarding electronic access and delivery of information were examined.

The Problem

Few Extension personnel, whether located at the state, district, or county level, have the expertise, knowledge or convenience to access computers that link them to information sources. Yet expectations are such that the Extension Service must utilize emerging communication technologies to meet the demands of an information-oriented society in order to survive as a credible source of information and education (Dillman, 1986; FACT Committee, 1991). As long ago as 1979, an Extension systems analyst realized that Extension risked losing the support of its clientele if it did not "take an active role in using this new technology" (Douce, 1979, p. 12). To further complicate the situation, no universal standards have been developed for information retrieval strategies, forcing users to learn different access procedures when searching various electronic sources (Burton, 1987).

Information technologies are being introduced almost daily, with little or no provisions in place to orient potential users to their most efficient usage. Information sources, such as databases, are proliferating at an even greater rate, engendering a bewildered and sometimes defensive attitude toward electronic technology that limits effective use of these information tools (Feder and Slade, 1984; Good, 1990; Imel, 1990; Noble and O'Connor, 1986; Wurman, 1989).

The North Central Region Educational Materials Project (NCREMP) has been available to Extension personnel since 1976, but as recently as 1991, awareness of this reference source is low. Consequently, the search service provided by NCREMP is under-utilized.

The Need for the Study

Michael Patton, in his keynote address at the 1989 Extension Technology Conference, noted that "Extension is an information-age idea. But is the System operating as an information-age organization with an information-age mentality?" (Cooperative Extension System Strategic Planning Council, 1991, p. 31). The implication behind these comments is that CES as a whole has not readily moved into the routine use of information technologies. Some of the reasons for this condition are examined.

No longer the only game in town, CES must now compete with other information-providing services, many of which have only recently established themselves. In twelve years, the *Directory of Online Databases* shows the number of online services maintaining databases increasing from 59 to 731. Normally, a business in its infancy is not readily able to find a niche in a market dominated by an established entity, but in the information arena, the old rules don't hold up. The spiraling number of online databases, combined with the increasing prevalence and availability of microcomputers (Huston and Oberman, 1989), is evident proof of this phenomenon, considering the industry was first publicly launched in 1967 (Arms, 1989; Norton and Haddon). In 1979, the *Directory of Online Databases* listed 400 available online databases. The 1991 issue lists 5,026 (*Directory of Online Databases*, 1991). Each database in and of itself may represent an enormous diversity of source documents.

Many of the information providers that are now competing with CES are able to capitalize on their ability to provide a targeted audience with specific information. Having established themselves in a field, they are able to focus on furnishing information that pertains only to that field. Having little or no history, they are unencumbered by traditional methods of

doing things, and are able to embrace and employ new communication technologies with a fervor that leaves one breathless.

CES, on the other hand, has a long tradition of comprehensive service; one in which it can take pride, but which may hamper it in the adoption of these same communication technologies. With the decline of a predominantly rural population and the advent of the "mass society", new clientele groups were identified as additional arenas for Extension educational efforts (Dillman, 1986). The breadth of subject matter CES has assumed responsibility for since its inception has become an albatross in the information age (Dillman, 1986; FACT, 1991).

Recommendations from the FACT Committee (1991) state that every Extension worker is expected to have remote access capability by 1993. It is imperative that CES understand how its personnel relate to electronic access and delivery of information so it can provide leadership in the development of a consistent strategy for acquiring, selecting, and interpreting information useful to its clientele. CES must be firm in its commitment of support to the new environment (FACT Committee, 1991).

Purpose of the Study

The overall purpose of this study was to refine the existing search procedure which provides bibliographic details on Extension educational resources in a database maintained by the North Central Region Educational Materials Project. A user-cordial data search strategy was designed to allow CES staff direct access to the NCREMP database from remote locations in order to search the database online. In the process of achieving this purpose, the following areas of investigation were pursued:

1. Identify the level of awareness and value of the NCREMP database among CES personnel.
2. Identify the degree of understanding of how to search a database among CES personnel.

3. Describe the use of online searching systems.
4. Determine the degree of familiarity and acceptance of computer use and computer-based information searching strategies among CES staff.
5. Develop a user-cordial search strategy for the NCREMP database that can serve as a model for Extension.

Operational Definitions[2]

Database: A database is a collection of data consisting of a number of records, each constructed of designated fields, and controlled by a series of operations that facilitate searching, sorting, report-generating and editing of the records. It is analogous to a filing system in which the method of storage and retrieval of files is organized in some specified manner. A relational database is one that links data-files on the basis of one or more common fields (Pollard, 1986). It allows users to access information from more than one field at a time. By "relating" the information stored in different fields, users can uncover linkages suited to their needs. A database that is available online is one in which the data is physically maintained in a location removed from the user, and can be directly accessed through the user's computer via modem or telecommunication networks (Norton and Haddon, 1988).

Database management system (DBMS): A layer of software between the physical database and a user that manages the user's requests for queries, reports, or updates, relieving her/him of having to know the physical locations and formats of records contained in the database.

Host computer: The main computer in a system of connected computers which houses data that may be accessible by users.

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[2] All operational definitions are taken from the Computer Dictionary unless otherwise noted.

Protocol: A set of communication rules which allow interconnectivity among computers of different makes and models in order that they may exchange information with as little error as possible.

Interface: On-screen directions that enable users to carry out a conversation with a computer program. They may consist of graphical designs, prompts, commands or other devices that a person sees displayed on a monitor.

User-cordial: Having the characteristics of simplicity and ease of learning and usage as they refer to programming interfaces.

User: An individual who interacts directly with computer software or hardware to accomplish a desired task. A casual user is an individual who does not regularly interact with computer programs, but may occasionally utilize them on a "need-to-know" basis. A naive user is one who has little or no background or experience in using computer programs, yet may need to manipulate one in order to gain access to information contained therein.

Remote user: One who is not in the immediate vicinity of the host computer she/he wishes to access. The interaction between the host computer and the user at a device located elsewhere occurs through a telephone connection or other communications line.

QUERRI: Acronym coined to characterize online access to the NCREMP database, and stands for *Questions on University Extension Regional Resource Information.*

DOS: A type of systems program that acts as the link between a user and a computer's hardware and software. Disk Operating System permits input and output capabilities within a computer that is supported by IBM-compatible computers.

Event-driven programming: A style of programming in which the program is constantly examining and responding to a set of situations generated by a user. The most common situations are added to a queue for processing in turn, while some situations can preempt others if they have been assigned a higher priority.

Menu-driven programming: A style of programming that presents a list of options from which a user can select in order to perform a desired action. Choosing from one menu often leads to a second menu or another series of options that further refine the original selection.

Boolean logic: A type of logic based on the concept that propositions are either true or false. In electronic information processing, it searches and selectively retrieves data-files by establishing relationships among the terms that identify each data-file and those used by the searcher, using qualifiers of intersection or conjunction (AND), union or inclusion (OR), and exclusion or negation (NOT).

Online Searching: Querying a database for information when actively connected to a host computer on which the database is stored.

Network: A group of computers and associated devices connected by communication facilities, such as cables or telephone lines. A local area network (LAN) is one is which a group of computers and support devices are located in a limited area and connected by a communications link or cable that enables them to interact with each other. It is an efficient way of electronically sharing hardware and files.

Internet: The name given to a series of networks grouped collectively into one large UNIX-based network established to provide connectivity between industry, education and research institutions, and government agencies. Established by the Defense Advanced Projects Research Agency and federally subsidized, its major backbone is the National Science Foundation Network (NSFNET), but it includes local, state and regional networks, all of which are funded individually (Coursey, 1991).

NREN: Acronym for the National Research and Education Network, an advanced, high-capacity computer network that will link supercomputers, libraries, laboratories, national databases, and academic and commercial researchers into a unified information infrastructure (Coalition for the National Research and Education Network, 1989).

Summary

There is concern that the Extension Service is not implementing electronic communication technologies rapidly enough to effectively compete with other information providers. Anxiety regarding electronic information accessing strategies must be overcome with education so their use becomes routine. Extension personnel need an efficient, easy-to-use method of accessing appropriate reference materials in order to comply with the CES mission of assisting people in improving their lives by way of an educational process that uses research-based knowledge focused on issues and concerns relevant to their needs. The purpose of this study was to extend the existing NCREMP information search system by developing an online access strategy that can serve as a model for Extension personnel seeking information from other sources, and to examine characteristics that promote positive adoption of electronic communication systems, specifically the search model, among Extension professionals.

CHAPTER II: REVIEW OF LITERATURE

The overall purpose of this study was to refine the existing search procedure which provides bibliographic details on Extension educational resources in a database maintained by the North Central Region Educational Materials Project (NCREMP). A user-cordial data search strategy was designed to allow CES staff direct access to the NCREMP database from remote locations in order to search the database online. The literature reviewed on the following pages describes the historical precedence set by the Cooperative Extension Service as an information broker for the public, and considers characteristics that may help to promote positive adoption attitudes among Extension staff regarding online database searching strategies.

The review of literature is divided into six segments:

1. A Foundation for the Cooperative Extension Service
2. The Role of Extension in the Past
3. Computers and Communication
4. Acceptance and Adoption of New Technology
5. The Technological Challenge Facing the Cooperative Extension Service
6. Aspects which Impact Online Searching by Casual Users

A Foundation for the Cooperative Extension Service

As Rasmussen (1989) recounts in his book, *Taking the University to the People: Seventy-five Years of Cooperative Extension*, the concept underlying the Cooperative Extension Service system dates back long before 1914 when the Smith-Lever Act formalized its existence. Because the United States' early history was so intertwined with agricultural development, educational efforts were generally focused on agricultural aspects. The first Morrill Act, passed in 1862, established a mechanism, through land appropriation, which provided a nationwide

system of agricultural education, the land-grant universities. The second Morrill Act, passed in 1890, provided monies for support, as well as prohibiting racial discrimination.

Unfortunately, enrollment in the agricultural colleges grew slowly, mainly because they had very little to teach--very little farming and cropping knowledge had been scientifically tested at the time. To ensure the continuation of these colleges, agricultural experiment stations, devoted to agricultural research, were established by the Hatch Act. The pieces were beginning to fall in place. The only remaining need was to combine the research efforts of the agricultural stations with the teaching mission of the colleges. The stage was set for development of the Cooperative Extension Service to fulfill this role.

The Department of Agriculture had been created at the same time as the first Morrill Act. Seaman A. Knapp, often called the father of Extension, held a position with the Bureau of Plant Industry in the Department of Agriculture in the early 1900's. With many years of agricultural experience behind him, Knapp was convinced that the adoption of better farming techniques lay in field demonstrations done by farmers on their own land. From efforts such as his cropping demonstrations, and farmer short courses, portable schools, farm trains, and home demonstration clubs, evolved the formal structure for the Extension system. The Smith-Lever Act established the Cooperative Extension Service nationwide and provided a framework for funding by three partners--federal, state, and county. Its purpose was clearly stated to "aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics and to encourage the application of same" (Rasmussen, p. 49). Particular emphasis was placed on assistance to the rural sector simply because at that time 90 percent of the population lived and worked on farms. What helped them helped the nation.

The demographics of our country today are radically different. No longer do the majority of the American people labor to produce the food we eat. Only about 2% are directly involved in agriculture production. Of course, many more are indirectly concerned with auxiliary

agribusinesses, but these entities are generally urban in nature, rather than rural. In Iowa, a state that historically and currently relies on agriculture as one of its major economic products, sixty-five of its legislators are from urban districts (Anderson, 1992). Diversity is another aspect of demographic changes which have produced a population that can no longer be satisfied with a single answer. With social and economic shifts creating distinct ethnic groups, single-parent households, aging baby-boomers, and two-income families, these audiences require vastly different assistance with their concerns (Cooperative Extension System Strategic Planning Council, 1991; FACT Committee, 1991). At the federal level, Janet Poley, director of ES/USDA's Communications, Information Technology (CIT), has positioned her agency so that any significance resulting from such diversity can be correlated to emerging telecommunications technologies, thus enabling CES to more effectively deliver programs or information to clientele (Brown and Poley, 1990).

The Role of Extension in the Past

During Extension's first few years of operation, logistical and administrative problems between county, state and federal levels were worked out. A large portion of the funds allocated by the Smith-Lever Act was directed toward strengthening the county agent system. The number of county agents and specialists connected to the land-grant universities grew steadily. The specialists responded to requests from county agents to meet with farmers to assist with problems and teaching.

Extension agents slowly gained acceptance, having to prove their worth to a sometimes skeptical clientele. Often their quick and effective response to crises such as hog cholera control brought them greater acceptance. Just three years after CES was initiated, World War I proved a turning point in establishing its credibility. Wartime posters depicted that CES could become a vehicle for meeting the national goal of increased food production. How? By

teaching farmers better methods of production and women and youth better ways of growing and canning produce from their gardens. That goal was achieved.

Farm and home visits quickly became the most effective method county agents used to reach people, but too few agents and too many farmers made this implausible as the only means. Group meetings and printed materials helped agents make more efficient use of their time and expertise. As early as 1919, county agents were using communication tools like telephones to keep in touch with their local clients. When the radio became available, it too was adopted to help Extension agents reach a wider range of the populace. Personal computers made their appearance on the scene in the 1960's, and seemed an appropriate tool for improving farm management skills. By the 1970's, many county Extension offices had at least one computer and offered various farm management programs for rural families. When the farm crisis hit agricultural producers in the 1980's, Extension was in position to provide farmers production and marketing assistance through computer analyses of their financial situations.

Unfortunately, Extension agents have not had the time, expertise nor the opportunity to fully exploit the potential inherent in computers as a communication device, partly because of their previous experiences with computer technology. In his chapter on *Experience and Education*, John Dewey (Parks, 1968) espoused his theory of the relationship between growth of an individual and that individual's experiences in life. He defined growth as a "cumulative movement of action toward a later result" (Parks, 1968, p. 74). The quality of plasticity he attributed to growth inferred that an individual had the ability to learn from experience, and to retain from various experiences some element that could be useful in a future situation. However, Dewey warned that simply experiencing things, without direction and guidance, did not serve the purpose of learning. In fact, if an experience had the effect of thwarting the possibility of further experience, it could be counterproductive. Past exposure to computer usage by CES personnel may have resulted in such a negative reaction, thereby influencing acceptance and implementation of the technology within the organization.

Computers and Communication

One of the areas in which computers have had extraordinary growth is in their ability to be connected so that access to printers, files and databases can be shared. In the beginning of the computer's genesis, there existed the mainframe, that commanding presence of computer technology that signified power--centralized power. By centralizing the origin of control, only a select few controlled the computing tasks that the mainframe system processed. Anyone who needed a job done by computer was obligated to submit a request, and wait at the convenience of the machine for results.

As computer usage increased in demand, it became apparent that such a bottleneck was limiting the use, as well as the development of computer applications. Time-sharing made data processing more efficient. The remote terminal came into being. It was a *dumb* terminal, in that it served only to link data, so there was no loss of control by those who maintained mainframes. But the dumb terminal at least allowed people to submit orders for computing jobs from remote locations--a sort of computerized streamlining of job requests, if you will.

Power continued to be the guiding light in computer development, with the inevitable result that control began to slip from the hands of the those controlling the mainframe. Miniaturization has contributed to development of the minicomputer, followed by the microcomputer, so that the computing capability of a mainframe system that took up a large room is now available in a personal computer (PC) that can fit on a desk. The PC of today has the speed, power and storage capabilities that preempt many of the applications previously done only on mainframe systems, with a great deal more convenience to the user (Tesler, 1991).

The acquisition and usage of personal computers has expanded exponentially in the last decade. The number of PC's in use has risen from almost nothing in 1980 to 45 million by 1990 (Feldstein, 1991). Ways to make these tools more productive have kept pace. One of the logical solutions was to share those tools, whether they be equipment or software programs. In the case of hardware, sharing printers and other peripheral devices eliminates duplication of

expensive equipment. Word processing programs, files, and databases, along with their management systems, can be housed in a host computer, or *server*, all of which can be used by PC's connected to the server through a local area network, or LAN. A LAN is a data communications network that allows groups of computer users to access and share computing resources through specific types of transmission media, such as cables, and connecting adapters, overseen by a network operating system that supports all necessary communications protocols and standards (Arms, 1989; Dortch, 1990). Computing power lies in the workstations, not in a central processor. High-end technology software can connect dozens of personal computers either through local area networks (LANs) or wide area networks (WANs) (Brannstrom, Wildeck, Leverich, 1989). Indeed, software development designed for network applications is currently the most limiting factor in making effective use of the sophisticated hardware now available (Tesler, 1991).

LANs usually link computers within a limited geographical distance, such as a department or building. While LAN's can connect hundreds of users, most support fewer than ten PC's, resulting in a more manageable system and limited ill effects from a possible network failure. Advanced LAN's today support multiple types of desktop systems, operating systems, and topologies, the physical connections between components. They incorporate levels of data security measures and system traffic features that allow the network supervisor to define and record user activity. A network manager is the individual who is responsible for the day-to-day operation of the network. While the position does not require a high degree of technical expertise, it does demand training and knowledge of how LAN'S operate and are manipulated, so that the system is not totally dependent on technical support staff or a vendor service call for minor adjustments. Unfortunately, few office personnel have the proficiency or receive the training to take on this responsibility, and seminars offered by vendors are often product-specific and expensive (Dortch, 1990). A cohesive network management software package is not yet available to help administrators easily oversee networks (Liebing, 1991).

In order to communicate with each other, computers must speak the same language; or, in computer jargon, have identical communications protocol. Protocols provide a common language so that computers of different manufacturers connected to a network can "converse" with each other to send and receive messages or use shared files and devices. The two most common methods used to control access to shared resources are Ethernet and token protocols, or signals. Using Ethernet, information is divided into packets that is coded with its origin, destination, and position in a particular message. Each shared device senses when a clear channel is available before transmitting the packets. When a collision occurs between packets from different devices, each device automatically pauses for a random length before retransmitting its information. This "waiting" period usually eliminates problems of simultaneous access. With the token protocol, a token, or flag, is passed through the network from device to device. Only the device with the token can transmit information, after which it passes the token to the next connected device, thereby avoiding any chance of collision. Up to now, the most widely used method has been Ethernet, but products supporting token LAN's are selling at faster rates than those for Ethernet LAN's, indicating that they may soon become as popular (Dortch, 1990).

The importance of networks in relation to information-sharing and communications cannot be underestimated or overstated. Michael Dertouzos, director of the Laboratory for Computer Science at the Massachusetts Institute of Technology, was not speaking in hyperbole when he said "The agricultural age was based on plows and the animals that pulled them; the industrial age, on engines and the fuels that fed them. The information age ... will be based on computers and the networks that interconnect them" (Dertouzos, 1991).

The ability of microcomputers to execute interface programs, retrieve data from a central storage source, manipulate and present that data, as well as engage in a dialogue of sorts with a user have opened up vistas of opportunity previously unimagined (Gorman, 1984). Coincidental to these developments has been the emergence of online information sources--

remote, electronic stores of data geographically distant from potential users. The original growth was stimulated by the scientific-technical-research sector, but by the late 1970's, the potential for the business-public market was recognized (Norton and Haddon, 1988). In less than three decades, online retrieval services have gone from the esoteric to the commonplace (Burton, 1987). Online sources now cover subjects of a limitless range of topics, and can be accessed vía microcomputers with a suitable telecommunication link.

Use of online services has been greatly enhanced by development of the Internet. The Internet is a "network of networks" (Kehoe, 1992), a collection of networks that share the same communication protocol. It provides the linking element for thousands of networks originating from government, corporate, research and educational organizations from all over the world (Coursey, 1991). Most large universities have mainframe systems that can access the Internet, so once an individual at a university has an Internet address, she/he can access its many services. These include electronic mail, telneting (a method of interacting with a remote host computer as if an individual using a computer was connected directly to the remote host), and file transfer protocol (a method of transferring data from one computer to another) (Kehoe, 1992). By 1990, the number of library online catalogs available on Internet rose from thirty to over 160 (Association of Research Libraries to the Subcommittee on Science, Technology, 1991). Approximately 535,000 hosts in 16,000 sectors (domains) have been identified. Table 1 (Horigan, 1992) shows the number of largest sectors with their hosts that have connectivity to the Internet. A host is any entity that has access to the Internet, whether it be an individual using a personal computer or a mainframe computer that serves many users.

No one entity owns the Internet. Several organizations provide significant financial support, among them IBM, MCI and the National Science Foundation, but it is in no way limited to their use. Internet has evolved like Topsy, with no preplanned infrastructure or control measures. Merit, Inc. is a private organization that currently manages the Internet, but the contract runs out in November 1992. Fortunately, a plan has been put into place to deal with

Table 1: Internet users

Domain	Host
Educational	26,000
Commercial	144,000
Government	36,000
Military	26,000
Australia	22,000
Germany	21,000
Canada	19,000
Organizations	15,000
Sweden	12,000
Switzerland	10,000

the continuance of connectivity.

In the early 80's, the National Science Foundation had created a network for supercomputers involved in advanced commercial and academic research, called the NSFNET (Strawn, 1991). As computer technology advanced worldwide, NSFNET users in the U.S. were not able to benefit because of limited access, insufficient connectivity to other networks, and the inability of the system to manipulate enormous amounts of data, all of which limited collaboration (Coalition for the National Research and Education Network, 1989). The need to promote further development of an information infrastructure of databases, online services, access mechanisms, and a more powerful network prompted introduction of the High Performance Computing and Communications (HPCC) initiative in Congress. One of the components of the bill is the National Research and Education Network (NREN), a network that would build upon the existing Internet, in particular the NSFNET. The final HPCC bill was signed by President George Bush on December 9, 1991. Passage of the HPCC bill ensures a more coordinated federal program in electronic interconnectivity throughout the United States (Strawn,

1991). CES can take advantage of the increased access to databases that will result. The FACT Report (1991) envisions that a wide array of databases will allow institutions without the resources to produce highly specialized information the opportunity to use the NREN system to make such resources available.

Acceptance and Adoption of New Technology

There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage than the creation of a new order of things...

Niccolò Machiavelli
The Prince (1513)

Inherent in all life is the concept of change. The scientific theory of evolution is the epitome of this concept as life forms evolve, or change into more adaptable forms over the millennia. Today, however, the concept has taken on an extraordinarily compressed connotation, to the extent that the cliché "the only thing that is constant is change" has come to represent a very real feeling of anxiety toward the rapidity of change occurring in our lives. When one considers that the innovation-decision process through which an individual first becomes aware of a new idea to the point of acceptance encompasses a series of actions and choices over time, one wonders how well continuous change can really be assimilated, let alone understood. Everett Rogers (1983) proposed five stages in his model of the process for individuals:

1. *Knowledge* occurs when an individual becomes aware of an innovation's existence and acquires limited comprehension of its operation.
2. *Persuasion* occurs when the individual adopts an attitude toward the innovation.
3. *Decision* occurs when the individual tests the innovation to determine whether or not to adopt or reject it.
4. *Implementation* occurs when the individual actually puts the innovation into use.
5. *Confirmation* occurs when the individual solicits support of the decision to either adopt or reject the innovation.

The debate as to which response comes first, need or awareness, is still argued among observers. Some feel that awareness of an innovation is a passive experience, since one cannot experience an innovation until one knows it exists. Others argue that individuals consciously or unconsciously reject ideas that conflict with their established attitudes, thereby avoiding exposure to messages about new innovations, unless the innovation is perceived to be relevant to their needs. Such a tendency is called selective exposure (Rogers, 1983). No clearcut evidence has been found to point to either of these arguments as the definitive explanation for the innovation-decision process.

The Cooperative Extension Service is experiencing radical changes in its traditional mission of delivering education and information to the public. Clients send signals to organizations, the most conspicuous being the withdrawal of patronage (March, 1981). In order to survive and thrive in the future, CES has had to reexamine the methods it uses to achieve its mission (FACT Committee, 1991). Have these changes been brought about by a perceived need within the organization to adopt a more sophisticated information processing system, or has the organization passively gone about its business until the realization was brought home that its clientele were not being satisfied with traditional means?

To investigate the answer to this question, it is necessary to realign our thinking of the innovation-decision process. Our earlier discussion focused on an individual's approach. When the unit of adoption is an organization, rather than an individual, previous models appear to have little value. An organization's response follows slightly different pathways, in part due to the structure inherent in an organized system of individuals. According to Rogers (1983), five stages make up the innovation-decision process for organizations:

1. *Agenda-setting* occurs when a problem is defined for which an innovation has potential for solving. Previous to this step is one of information-gathering and planning for the possible adoption of an innovation.

2. *Matching* occurs when a fit is made between a problem and an innovation.

3. *Redefining/restructuring* occurs when the innovation is modified and re-invented to conform with the organization and its problem, and structures within the organization are modified to accommodate the innovation.

4. *Clarifying* occurs when the relationship between the innovation and organization is clearly defined.

5. *Routinizing* occurs when the innovation is accepted as a common element in routine activities.

Neal Gross et al. (1971) undertook a study to measure the sociological impact of planned change within an educational entity. The innovation that was to be implemented was a new teacher's role, one as catalyst or guide to motivate lower-class children and improve academic achievement. The researchers found four reasons for failure of acceptance and subsequent adoption of the innovation:

1. A lack of clarity about the new innovation existed among organization members. There was no clear image about the role performance expected of the teachers before, during or after its introduction.

2. Organization members lacked the skills and knowledge needed to fulfill the expected role. There was a low level of capability within the organization to implement the innovation.

3. Required materials and equipment were unavailable. Teachers were expected to draw from existing resources to achieve desired results.

4. Several organizational conditions that were in place before and during introduction of the innovation were incompatible with its successful implementation.

From their findings, the researchers argued that assuming the innovation had in fact been implemented just because it was initiated by administrative directive, was a misleading one. The case study showed that the barriers experienced by the teachers, and which contributed to their inability to adopt the innovation, arose during the initiation phase *after* the innovation was introduced. To assume that failure of implementation occurs because an innovation itself may be wanting, that adequate financial support is lacking, or that participants resist the change, is to completely overlook the possibility that participants were not given appropriate support to implement the innovation. Additional training, modification of the organization's status quo, suitable stress handling techniques, feedback mechanisms, an open atmosphere of dialogue,

were all aspects that were either not acknowledged as problems or ignored by administration during the initial introduction of the innovation (Gross, Giacquinta and Bernstein, 1971).

While Extension leaders agree that the demands of a diverse and fluid clientele now call for a more effective response mechanism from the organization, it has proven difficult to move away from an inability or unwillingness to modify the organization's present structure (Rasmussen, 1989). Agenda-setting, matching, redefining and restructuring, and to some extent, clarifying have all occurred at various levels throughout CES regarding the changes needed to ensure its continuance in the coming century (FACT Committee, 1991). What remains to be seen is how well the communication technologies recommended are accepted, implemented, and actually routinized by organization members.

The Technological Challenge Facing the Cooperative Extension Service

The complexity of information today is daunting. The last 30 years has produced more new information than the previous 5,000 (Large, 1984). Technology advances in producing, processing, printing and distributing information has caused the rate at which it is available to soar. Before 1989, the amount of information doubled every 5 years; now it is less than every 3 years (Wurman, 1989). Whereas the agricultural and industrial ages were based on finite natural resources, information seems to be infinite. That thought is alarming enough, but becomes even more so when one's professional responsibilities hinge on having to manage it.

Richardson and Mustian (1988), in studying North Carolina agricultural producers' perceptions of the current and future ability of the North Carolina Agricultural Extension Service (NCAES) to provide state-of-the-art technical information, found that there was some concern among the respondents as to whether the Extension system could continue to satisfy their needs. More than 81% felt that more complex information was needed in the future as compared to current needs. At the same time, almost 90% believed that Extension had the ability to deliver needed technological information. Such a perception may reflect the

respondents positive past experiences with Extension, since there was a strong correlation between attitudes toward NCAES and farmers' perceptions of Extension's capacity to provide valued information.

Traditional methods of serving clients many continue to be appropriate, but electronic technologies should be used to augment these methods, as well as increase their efficiency and effectiveness (FACT Committee, 1991; Richardson and Mustian, 1988). Warmann and Rice (1988) identified the informational needs of Virginia farm operators and evaluated farmer perceptions of Extension programs. Virginia itself represents a state of diversity in that no one commodity or system of production dominates. Perhaps this diversity accounts for some of the responses. Many farmers (41.3%) were not really sure what kind of information would help them the most. Forty-three percent indicated that Extension could best serve their needs by providing marketing information, while 26% said that production information would be most helpful. Another 21% wanted financial data. As far as the most important perceived source of information was concerned, Extension was rated higher than any of the other sources included in the study (41%), followed by farm magazines, ASCS, Farm Bureau, trade associations, and banks. Mirroring the findings of the FACT Committee (1991), the researchers concluded that a combination of approaches that include electronic communication strategies may be most effective in reaching farmers.

How well Extension personnel acquire and use the skills needed to access electronic information will determine not only the survival of the system, but its growth and future success as well. Computer anxiety among Extension personnel exists, due in part to the natural uncertainty and hesitancy most people experience when confronted by a new concept (Noble and O'Connor, 1986; Kuhlthau, 1990), but also because of the manner in which computers were introduced in the Extension system.

The hardware and software that is such an integral part of the electronic information age has had a seductive aspect (Wurman, 1989). We have all been awed by the power evinced by

those little "boxes" sitting on our desks. Reports, graphic layouts, management programs, electronic transmissions--all so magically executed with a few keystrokes. Who wouldn't want to have that kind of power available at one's fingertips? Before anyone had a chance to ask *"What can it do for me and how do I get it to do that?"*, purchases of hardware and software were made with little thought given to actual need, degree of friendliness, level of acceptance, or compatibility across systems (FACT Committee, 1991).

An even more serious oversight was the lack of a strong and committed in-house educational effort at the onset of hardware and software acquisition, so that the magic and power of these tools could be effectively harnessed and used by all Extension staff. Enthusiasm for the technology blinded many to user reaction (Noble and O'Connor, 1986). The result was predictable--a level of anxiety and defensiveness regarding these information-age tools that rendered them little more than glorified typewriters.

Richard Wurman (1989) writes in his book *Information Anxiety*, "In our enthusiasm to exercise new machinery, we create unnecessary anxiety; the new toy syndrome operates with telecommunications equipment as much as with Tinkertoys...Efforts [in technology development] surpassed the support services, institutional policies, programs and systems that would enable us to handle enormous quantities of information through understanding."

Worden (1985) investigated computer attitudes in Extension on a national basis and found that three-fourths of Extension home economist professionals were not comfortable with computers. She suggested that all Extension staff be allocated time and financial support to become computer-literate. In looking at how farmers reduced uncertainty and thus were more likely to adopt a new innovation, Fedor and O'Mara (1981) used knowledge relating to an innovation as a determining factor in its adoption. Their analysis suggested that a critical level of cumulative information must be realized before adoption takes place. Smith and Kotrlik (1990) found that computer skill level was the best predictor of computer anxiety among Extension

agents. With exposure and practice, agents became less computer-anxious and were more likely to use computers in their work.

If the expectation is such that Extension personnel begin using computers as information-accessing devices on a routine basis, computer training takes on an added dimension--how to access and search databases. Few studies have explored the area of accessing online databases by Extension personnel. Dahlgren (1987) investigated agricultural economists' use of bibliographic online databases and found that a) the lack of awareness of electronic bibliographic databases among agricultural economists was significant, b) those who did use databases consider their future importance greater than did non-users, c) those who used databases preferred accessing citations electronically, and d) satisfaction of usefulness was higher for users than for non-users. His findings support those of Smith and Kotrlik regarding likelihood of use.

Shaffer (1991) analyzed the usage of PENpages, a computer-based information service developed at the Pennsylvania State University's College of Agriculture in 1985. It was designed to disseminate Extension news, research developments and provide state-wide 24-hour access to a full-text database consisting of educational materials for Extension staff. She found that training was an essential component for ensuring use of the system by field-based staff. Of those who did use it regularly, having access to new and updated information was seen as beneficial. Over half the respondents preferred electronic transmission over surface mail as the delivery method for receiving reference information. Once again the findings indicated that training and familiarity positively impact accessing and searching online databases.

Aspects That Impact Online Searching by Casual Users

It was not long ago that online information searching and accessing was the domain of a trained intermediate, usually a library or reference specialist (Eisenberg, 1983; Hunter, 1983). The explosion of affordable microcomputers on the public scene has changed the course of

information accessing dramatically. Michael Eisenberg of Syracuse University says "What was originally thought to be a tool exclusively for researchers and subject specialists is becoming increasingly available to lay persons" (Eisenberg, 1983). Everyone who has access to a terminal or microcomputer and modem now has the potential of being a casual user of electronic information (Griffith, 1983). There will certainly be an increase of naive users, those who have no training or experience in browsing through electronic information sources. These individuals may be subject experts, but they do not have the familiarity, training or skills associated with searching and retrieving information from computerized systems. Extension staff most assuredly fall into this category. Huston and Oberman (1989, p. 202) wrote that "While technological advances have made information *available*, they have not made it necessarily *accessible*."

Studies show that novices search more slowly and make more errors than do experienced searchers (Aversa, 1985; Burton, 1987; Dahlgran, 1987; Hunter, 1983; Imel, 1990). The more complex and/or comprehensive a search is, the more likely a casual user will need assistance to successfully complete the search. However, the hazards of searching on one's own do not appear to overshadow the benefits of immediacy, convenience, continuity, relevancy, and not having to explain one's need to an intermediary (Eisenberg, 1983; Imel, 1990).

Casual users perceive the value of doing their own searches (Hunter, 1983), but the overwhelming number and complexities of access procedures, command languages, search and retrieval processes, and database structures do not encourage wide-spread usage (Rouse, Rouse and Morehead, 1982). The logical solution would be standardization of some of these functions. Committees have been formed to address the issue and numerous articles have been written offering guidelines, recommendations and models. One of the commonly employed suggestions is to have online tutorial programs which can be called upon independently by casual users to initiate or refresh their grasp of searching techniques for an online database. Features such as telecommunications protocols, access procedures, system languages and

terminology may be addressed. The problem with many of these is their specificity--either the instruction applies to one or a few databases, or it is so generic that it is of little value to the inexperienced searcher (Eisenberg, 1983). The underlying assumption of this approach is that a "single, best" model of information search and retrieval is valid for all users. As more research is generated in this area, such an assumption is proving to be false (Hunter, 1983).

The casual user faces relearning searching procedures every time she/he accesses a database. It is not surprising to find studies showing that ease of using an information-seeking technique was more important to a casual user than the volume of information generated by the search (Morehead and Rouse, 1982). Dr. Art Hussey, director of PENpages, the Pennsylvania State University computer-based information system, found that users did not appreciate full-text retrieval capability. Such a strategy listed every document that contained the search keyword embedded in the text. Consequently, many documents that had no relevancy to the search were retrieved, which frustrated users. They lost confidence in the search strategy because they expected the computer program to intuitively narrow the search to conform to the way they envisioned it. These findings probably reflect the frustration a casual user feels when confronted with relearning a search strategy. The greater the frustration, the lower will be the quality of the search.

Another alternative is to make online systems themselves more user-cordial, regardless of the user's degree of experience. Since it is a fairly safe assumption that there will always be "new" users of an online system, building ease of use into the searching and retrieving mechanisms seems an obvious solution. Through a combination of prompts and explanations, instruction on the use of a database can be embedded in the system itself. The key is to design the user interface so that it complements the user's ability and helps to overcome lack of experience and skill (Rouse, Rouse and Morehead, 1982).

Literature shows that untrained individuals searching for information electronically do so by a trial and error method. The topic to be researched is identified, and keywords associated

with the topic are generated, either through memory or a thesaurus. A keyword is entered to allow the program to browse through the database for those records associated with that keyword. The resulting entries are examined for their value in terms of relevancy to the original query. If the entries are not satisfactory, the search profile can be altered with other keywords for retrieval of additional records (Morehead and Rouse, 1982). One of the limitations of this approach is that search results may be satisfactory from a casual user's perspective but not from a reference specialist perspective. As Susan Imel understated, "If you have not sufficiently focused your topic, ... it can result in irrelevant materials" (Imel, 1990).

Eisenberg (1983) described early attempts to streamline accessibility to many different database systems through an interface designed to handle different stand-alone online databases. Each existing interface was replaced with one, simpler interface (CONIT). Results of experiments using CONIT indicated that inexperienced users could effectively use a translating interface to search and retrieve relevant entries.

Another tactic Eisenberg reviewed was complete avoidance of the problem of heterogenous interfaces by the use of an "assistance mode". A system is programmed to monitor an ongoing search by examining both commands and responses. If an error or problem is encountered, the system offers suggestions on how to proceed, with a set of diagnostic options presented to the user. Successful completion of the query is directed according to responses generated by the user. Such a system would be event-driven. A refinement of this approach is that the program can suggest additional search terms.

User-cordial screen design provides a formatted screen which guides the user through the search process. Certain instructions always appear on the screen. This simplifies the process and keeps the casual user from becoming disoriented while navigating through a search routine (Eisenberg, 1983).

Menu systems are another attempt to alleviate the frustration a casual user may develop while searching online catalogs. One of the major advantages of menus is that by presenting

the user with a highly structured format to follow, the need for training and memorization of system commands is eliminated. A user is continuously prompted while executing a search. This type of programming displays an easily-negotiable path through a program, and presents the casual user a less intimidating prospect than having to relearn program commands each time a program is utilized. One of the criticisms of this approach is that it provides no incentive for the user to ascend to a higher level of sophistication in managing the comprehensiveness of a search (Arret, 1985). Because this study focuses on the casual user, this criticism was not a concern in the development of the search strategy.

Successful online database searching requires a special mental process on the part of searchers. They must match their experience, intelligence and intuition with that of the particular search strategy they are using (Ness, Jr., 1990). The more a strategy approximates seamless sequencing of search procedures and online assistance, the more it will produce satisfactory results for the casual or naive user. Criteria as reviewed by Eisenberg (1983) and proposed by Rouse, Rouse and Morehead (1982), Radhakrishnan, Grossner, and Benoliel (1981), and Larson (1987) likely to offer such sequencing are:

1. a structured representation of the search process, i.e., formatted screens with certain information always appearing on display,
2. natural language scripting of search options, prompts, cues, and help screens,
3. a keyword thesaurus easily referenced at any time during a search,
4. an interface designed to facilitate learning to search by naive users that is flexible enough to allow adaptation for more advanced users,
5. search logic that emulates human cognitive processes as much as possible, i.e., alternatives or modifications of Boolean operators,
6. online tutorials and help screens with simple, straightforward explanations describing the choices at hand that can be employed as needed,

7. close association between terms identifying data-files and possible terms used by searchers,
8. capability of at least one level of searching beyond the initial search, i.e., narrowing a search down with another keyword,
9. minimum system administration requirements, i.e., accessing procedures that expedite connection, no passwords or codes, and
10. an uncomplicated fall back mechanism for easy recovery from errors or ambiguities.

Summary

The Cooperative Extension Service has had a long history of successfully carrying out its mission of "taking the university to the people" (Rasmussen, 1989, p. 3). To do so, CES developed a human network of agents that reached right into the homes of the American public. As one of the few agencies that had such a web of direct contact, it served as the premier agent for educational change and problem-solving. Results of agricultural research have been converted into practical applications to help make American agriculture one of the world's most productive systems. Education in the fields of nutrition and health has helped to improve the lives of urban and rural families.

Shifts in demographic and societal trends over the last twenty years have radically changed the needs and demands of the public. Most dramatic has been the advent and astronomical advances made in electronic technology, specifically in communications. CES had been slow to anticipate, respond to, and adopt these changes, and has been perceived as too tradition-bound to be relevant in the world. Today, rather than people, many of the networks that serve people consist of computers and related devices that link research institutions, government, public and private agencies, and individuals through communication lines across

the globe. Along with the hardware connections has come the development of electronic information sources available through these linkages and the protocols to access them.

The speed at which these technology changes has occurred has resulted in a short circuit in the normal innovation-decision process. Introduction of electronic information-accessing technologies to Extension personnel has been immediately followed by high expectations regarding their implementation and use. In many cases little training or support has been available. The result has been, at best, a poor understanding or appreciation of their value; at worst, a level of anxiety that precludes their effective adoption and use.

The body of literature related to computer-oriented learning among Extension workers has shown that proper training and familiarization can overcome anxiety-induced attitudes. Other studies, documenting principles and designs leading to increased understanding and assistance in information-seeking behavior, have proved helpful in providing a basis for development of the ***QUERRI*** search strategy.

CHAPTER III: METHODS AND PROCEDURES

The purpose of this study was to refine the existing search procedure which provided bibliographic details on Extension educational resources in a database maintained by the North Central Region Educational Materials Project. To achieve this purpose, a user-cordial search strategy was designed to permit online access and searching of a database maintained by the North Central Region Educational Materials Project. To accomplish this purpose, the following areas were investigated:

1. The evolution of CES into a sophisticated information processing system was researched by examining attitudes and aptitudes of Extension personnel regarding electronic information-accessing technology.
2. Awareness and value of the NCREMP database among Extension personnel at all position levels was surveyed.
3. Developments in online information-accessing and delivery that facilitate efficient handling and processing of large volumes of data were identified.
4. Characteristics and indicators of user-cordiality and ease of use in online data search strategies were assessed.

Research Design

A descriptive approach of a qualitative nature was taken in developing the search strategy. The study was concerned with conditions and practices currently existing in CES-- the restructuring that is going on, attitudes held by Extension workers toward electronic information technology, expectations in the usage of such technology, and the effects these expectations have induced. There was no control of a treatment, and the study did not test a hypothesis (Ary, Jacobs, and Razavieh, 1985). Relying on impressions and experience as a database manager working with Extension personnel, the researcher has surmised that Extension

employees have little familiarity with online search strategies. For the most part, the experiences they have had using computers as a tool for information access have not been anxiety-free enough to encourage Extension workers to adopt routine use.

The purpose of this chapter is to describe the steps taken in achieving the purpose of the study. The steps were as follows:

1. A literature review was done to obtain background on the aptitudes and attitudes of CES personnel in their use of electronic communication, specifically online database searches. The review also investigated areas of research in training users of online information search and retrieval systems, which were helpful in the design of the model search strategy.
2. Selected relevant items from a questionnaire developed to support documentation for renewal of the North Central Region Educational Materials Project were used to provide a direction in the development of model. Items related to familiarity and usage of information search and retrieval systems by CES personnel.
3. Responses to the questionnaire were collected in face-to-face encounters with CES employees attending national association meetings, and by mail to state specialists within north central states. Frequency tables were generated from selected relevant items.
4. A bibliographic information search and retrieval model was developed to allow remote users to access the NCREMP database online.
5. The search model was pilot-tested with field staff and state specialists from Iowa State University Extension.
6. Revisions and adjustments to the search model were made in accordance with responses solicited during pilot testing.

7. Telecommunication capabilities at Iowa State University were investigated to determine the appropriate connection between a remote user and the search model system which would be operated from a microcomputer in the NCREMP office.
8. An existing LAN in the NCREMP office was modified to allow online accessibility to the NCREMP database by remote users through a modem or the Internet.

Orientation to NCREMP

The North Central Region Educational Materials Project (NCREMP) functioned as an information clearinghouse by providing Extension personnel within the north central states a computerized search service of a database containing bibliographic information on educational materials produced by Extension. Both written and audio-visual resources are included.

Regional sharing of Extension materials was the impetus for creating NCREMP. Many issues are of common concern in north central states. Educational resources produced in one state can often help specialists in other states who plan to develop a resource on the same subject. With cross-program, interdisciplinary issues programming a reality for Extension educators today, accessibility to a database of Extension materials produced beyond one's own state boundaries can be a helpful tool. NCREMP provides the mechanism for such accessibility.

Requests for searching the database have been sent by mail, telephone, fax or electronic mail, and had been processed by office personnel. A hard copy of results was then mailed to the individual within one week or sent by electronic mail.

A second function is to facilitate the circulation and review of materials submitted for regional status among the thirteen participating north central land-grant institutions. This second function is not directly concerned with the purpose of this study, other than to add educational resources to the database when they are regionally approved.

NCREMP liaisons in each of the thirteen NCR institutions are responsible for distribution of search forms and promotion of its use among Extension staff at their universities. However,

these individuals have other responsibilities not related to NCREMP that take precedence, so their commitment to actively promoting use of the database is sporadic at best. A more expedient approach to maximizing use of the database was sought. Development of an online search strategy that allowed Extension personnel the freedom and convenience of accessing and searching the database from a computer at their location was the purpose of this study.

Developmental Design for the Search Strategy Model

In order to assimilate desirable characteristics from search and retrieval systems reviewed in the literature, a conceptual framework was formulated before development of the QUERRI model. The concept that emerged attempted to simulate the intuitive reasoning processes followed by an individual who is trying to find information for a specific purpose.

Questions that the coordinator continually focused on were "What factors caused anxiety among CES personnel when faced with electronic technology, specifically online search strategies? What approach would lead to increased usage of a search strategy? What criteria should be incorporated into a search strategy so that it is appropriate for all levels of potential users?"

While differences among Extension employees regarding level of position, degree of responsibility, and experience with computers vary widely, enough commonality in their relationship to the Extension system was present to consider them an intact cultural community (Borg and Gall, 1989). On this basis, the search strategy was developed to be used by all members of the Extension community, regardless of their position within the organization.

Components involved in construction of the search strategy:

1. Telecommunications Connections
2. Custom Data Retrieval Program
3. Search Logic
4. DOS User Interface

5. Data Integrity

6. Survey of Comprehension and Use of Search Strategies by CES

Telecommunications connections

The Iowa State University telecommunications office helped determine the most appropriate method of connecting the microcomputer that would serve as the ***QUERRI*** workstation for remote users. The university had installed AT&T's Information System Network (ISN) that provides packet-switched asynchronous serial connectivity between computers, terminals and LAN's both on and off campus through telephone lines. Dialup capability for off-campus callers is achieved through a pool of 50 modems which enables remote users to connect via modem, or directly into a designated ISN port through the Internet. The ISN port in the NCREMP office has been programmed with the acronym ***QUERRI***, so remote callers using the Internet only have to type "querri" at the dial prompt that appears after they connect with the ISN. Either upper or lowercase is acceptable.

Custom data retrieval program

The program developed for remote access was written in C language to allow asynchronous input and output. Because remote users connect to ***QUERRI*** through telephone lines which support only asynchronous transmission, it was necessary to conform to this restriction. All that is required is to set remote protocols at 8 data bits, one stop bit, no parity, full duplex, XON/XOFF handshaking. This ensures that virtually any remote asynchronous computer or terminal has connectivity to the ISN at Iowa State University either through a modem or the Internet. For Internet connectivity, an ISU terminal server translates messages (data) between the ISN and the remote caller.

Initially, DOS was not developed as an environment that could handle more than a single user at a time. Other systems and devices have since evolved that are better able to

accommodate multi-user access. Budget constraints prevented changing to a multi-user platform which would permit simultaneous access by several remote callers. However, the university's ISN is equipped to handle multi-users if conversion within the NCREMP office is feasible in the future.

No attempt was made to exercise authority control of users' names. Questions relating to demographic information are displayed when the user accesses ***QUERRI*** (see Appendix A). Responses to these questions are used for monitoring usage of the system. When a user exits the search process, several evaluative questions will be displayed to measure degree of satisfaction the user experienced with ***QUERRI***.

Search logic

One of the most common methods of establishing a "search and retrieve" relationship between user queries and data-files is with Boolean logic (Eisenberg, 1983; Mancall, 1984). Various terms, such as keywords, are used to identify each file. Using the operators "AND", "OR" and "NOT" in search queries generates retrieval of files in different ways. A query using the "OR" operator retrieves any and all files that have terms linked by "OR". If we let circles represent all files identified with a term, the shaded areas in Figure 1 graphically illustrate the group of files that are retrieved by terms linked with "OR" (Mancall, 1984).

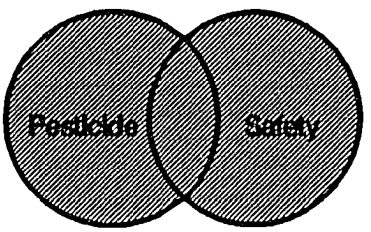

Figure 1: "OR" Boolean operator (union)

Querying with the "AND" operator retrieves only files that have terms linked by "AND" in the query. Essentially, the number of files retrieved is reduced by imposing an "AND" condition. The shaded area where the circles intersect in Figure 2 represent the files retrieved using "AND".

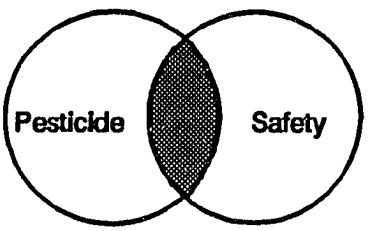

Figure 2: "AND" Boolean operator (intersection)

The "NOT" operator is used to deliberately exclude files from retrieval by specifically using the term identified with those files. If we continue our example of searching for files identified with the terms "pesticide" and "safety," but do *not* want files identified with "home," the shaded area in Figure 3 shows the group of files retrieved with the query "pesticide and safety not home".

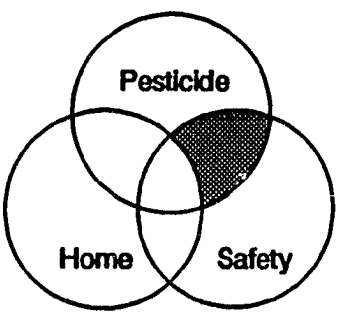

Figure 3: "NOT" Boolean operator (exclusion)

Unfortunately, as pervasive as Boolean logic is in search retrieval programming, it is not a concept that is readily grasped by casual searchers (Eisenberg, 1983; Salton, 1988). To ensure the least amount of anxiety and confusion among Extension personnel as potential users, only one Boolean operator was used. The "AND" operator was used to reduce a search that has already retrieved citations with one term. In the case of ***QUERRI***, terms are keywords. The

equivalent of an "OR" search is accomplished by beginning a new search with another term, or keyword.

DOS interface

Considering the acceptance level of computers and degree of competence in online information-seeking that exists in CES, the retrieval strategy to directly access ***QUERRI*** needed to conform to a fairly moderate level of expertise. After evaluation of various search mechanisms, a menu approach was selected for its clarity, flexibility, and lack of memorization of system commands. A DOS interface mediates and translates the user's requests into computer terms, and was custom designed by a programmer, under guidance from the NCREMP coordinator. It reflects a conversation-like style that does not intimidate casual or naive users, but rather stimulates them to explore and manipulate the system, without resulting in anxiety. A complete set of menu options is included in Appendix B.

Data integrity

One of the major concerns was to maintain intra-system security (Detweiler, 1984). Since potential users of the system may be any individuals with access to a computer and modem who are not required to register or be traceable in any way, securing the database was an essential objective. All files are locked, with READ-ONLY access to users. Remote users do not have editing rights, thereby eliminating potential corruption of the database, accidental or intentional. Operational flexibility for future conversion to multiple users has been provided for in the programming structure.

Questionnaire on comprehension and use of search strategies by CES

NCR Extension Directors make a decision regarding NCREMP renewal on a 3-year cycle based on an annual report. Each report includes an evaluation of searches (processed by office personnel) to satisfy on-going maintenance which contributes to development and improvement. A short evaluation form (see Appendix C), measuring satisfaction of the search process, had been sent to each individual who requested a search, along with a hard copy of search results.

Because responses to these evaluations measured satisfaction *after* a search was processed, they could not assess the degree of awareness of the search service. Nor did they query how familiar Extension personnel were with electronic information-accessing techniques. To generate supporting documentation for the online access system to be presented at the Directors' meeting in March, 1992, a questionnaire was developed to determine the extent of awareness, understanding, and use of database searching among Extension personnel, in particular the NCREMP database (see Appendix D). The questionnaire was *not* designed or administered to provide data of statistical relevancy to this study. It was an unscientific poll with some pertinence. Specific items on the questionnaire relating to number of times respondents have searched or would search an online database were useful in planning the model search strategy. Items on the questionnaire were presented in closed form, permitting only certain responses. Not all items lent themselves to the use of a Likert scale. Only item numbers 6, 8, and 9 were ranked on a scale of low, moderate, or high. Precise definition's of low, moderate and high were not outlined for respondents, thus their interpretation of these rankings could not be quantified. Cronbach's Alpha was used to determine the internal reliability of these items.

The sampling technique was purposive as the questionnaire was distributed by the NCREMP coordinator at national association meetings for agricultural agents, home economists, and 4-H staff. Since those attending such conferences are usually county or area Extension personnel, the questionnaire was also mailed to state specialists within the NC region to include input from this group as well. The coordinator did not attend the national meeting of the

Community Development Society, thus community resource specialists were not specifically included in the survey. The researcher cannot verify whether the sample was representative of the population, so this technique did not provide a statistically random sample. But it was a means of uncovering what Borg and Gall (1989) refer to as "multiple realities," meaning a wide array of Extension personnel was surveyed. It also met the needs for NCREMP renewal documentation. Responses were presented to the Directors which offered sound evidence for renewal of the North Central Region Educational Materials Project.

CHAPTER IV: RESULTS AND DISCUSSION

The purpose of this study was to refine the existing search procedure which provides bibliographic details on Extension educational resources in a database maintained by the North Central Region Educational Materials Project. To achieve this purpose, a user-cordial search strategy was designed to permit online access and searching of a database maintained by the North Central Region Educational Materials Project. In researching criteria that would serve as a basis for development, the following areas were investigated:

1. The evolution of CES into a sophisticated information processing system was researched by examining attitudes and aptitudes of Extension personnel regarding electronic information-accessing technology.
2. Awareness and value of the NCREMP database among Extension personnel at all levels of positions was surveyed.
3. Degree of understanding on how to search a database among Extension personnel at all levels of positions was measured.
4. Developments in online information-accessing and delivery that facilitate efficient handling and processing of large volumes of data were identified.
5. Characteristics and indicators of user-cordiality and ease of use in online data search strategies were reviewed.

The contents of this chapter represent the results of applying the framework described in Chapter III in designing and developing the online search strategy for the ***QUERRI*** database, with particular attention paid to the attitudes and aptitudes of CES personnel. Also considered were recommendations from the FACT report (1991) detailing Extension administrative expectations regarding adoption and implementation of electronic communication technologies to deliver high quality educational programming to clients and staff.

Results

Questionnaire findings

A questionnaire was constructed to satisfy requirements for NCREMP renewal documentation, which consisted of 18 statements, many with multiple options for selection (see Appendix D). Since the purpose of the questionnaire was not specific to this study, no personal demographic characteristics such as gender, age, or education, were needed for statistical use. Certain items on the questionnaire served as supporting evidence in determining the level of understanding Extension workers have in online searching techniques, and for justification in development of the ***QUERRI*** search strategy.

A total of 350 responses were obtained from Extension field and state professionals in the fall of 1991. County and area/district respondents had been given the questionnaire by the NCREMP coordinator during national association meetings. Because the questionnaire was sent to NCREMP liaisons in north central land-grant institutions for distribution to state specialists, the number of state specialists that did not return a completed questionnaire could not be determined.

Data in Table 2 shows the distribution of respondents by state and position within the organization. Ninety-six percent of the respondents were from north central states. Agents from those states were deliberately solicited because of their affiliation with the north central regional states (NCR). Responses from states outside the NCR were evidence of an active interest by persons from those states who requested a questionnaire and were included in frequency tables. Subject matter of the respondents encompassed all national initiative areas, as shown in Table 3.

Respondents were asked to describe their ability to have access to a computer with a modem. Data shown in Table 4 indicates that 98% of all respondents either had their own computer or access to one in a nearby office. Of those with proximity to computers, 79% had access to a modem.

Table 2: Distribution of respondents who completed questionnaire

State	Level			Total
	County	Area	State	
AZ	1	0	0	1
CA	2	0	0	2
IL	4	1	20	25
IN	4	0	0	4
IA	8	0	29	37
KS	3	12	20	35
MI	1	2	21	24
MN	2	0	10	12
MO	23	28	12	63
NE	1	1	8	10
ND	1	0	30	31
NY	4	0	0	4
OH	4	0	8	12
PA	0	5	0	5
SD	56	1	21	78
UT	1	0	0	1
VA	0	1	0	1
WA	1	0	0	1
WI	2	0	1	3
DC	0	0	1	1
Total	118	51	181	350

They were also asked to indicate the number of times they had requested a computer search within the last year. The mean number of requests made within the past year for all respondents was 3.3 requests. More state specialists requested searches ($\bar{X}$ = 4.2) than did county ($\bar{X}$ = 1.6) or area staff ($\bar{X}$ = 3.5), not surprising since state specialists are oriented toward searching the literature when developing new resources.

Table 3: Subject matter represented by respondents

Food Safety	Intn'l Mktg.	Rural Devel.	Sustain. Agrl.	Waste Mgmt.	Water Qlty.	Youth at Risk
38%	15%	51%	50%	43%	53%	34%

If respondents had access to a computer, they were asked how many times a month they *would* search an online database of Extension materials from north central states. The mean number of times respondents indicated was 2.4 times. More county staff said they would search the database ($\bar{X}$ = 3.3) than did state ($\bar{X}$ = 1.7) or area specialists ($\bar{X}$ = 2.2). This reversal in position between searching staff had done and searching they would do may be an indication that county staff are becoming more aware of other sources of information that may be useful to them in serving their clientele and wish to explore them.

Table 4: Computer accessibility among respondents

	Own office	Nearby office	With modem
County (118)	67%	33%	95%
Area (51)	80%	20%	76%
State (181)	87%	11%	74%
All (350)	79%	19%	79%

Table 5 shows the level of understanding of how to search a data base. The majority of respondents rated themselves with low understanding. This may account for the low mean for number of times they had searched or would search an online database.

Respondents were also asked about their familiarity with electronic mail on the Internet. Offered a variety of reasons to select as to why they did not use it, Table 6 shows the major reasons for non-usage. Refer to Appendix D, item #17 for a complete list of possible reasons.

Table 5: Level of understanding in searching a computer database among respondents

	0 to Low	Moderate	High
County (118)	80%	16%	5%
Area (51)	65%	31%	4%
State (181)	46%	43%	11%
All (350)	60%	32%	8%

Only 17% of all subjects responded that they were current users of electronic mail. Almost a third felt they did not understand the procedure well enough to use it. Nineteen percent stated that they knew they did not have access to the Internet. Fifteen percent indicated that they were not aware of Internet as a vehicle for communication. Only 12% felt they would use this type of communication in the future.

Table 6: Use of electronic mail among respondents

	Current User	Don't use because...			Plan to use in future
		don't understand procedure	no Internet access	not aware of this method of communication	
County (118)	12%	37%	13%	27%	7%
Area (51)	16%	37%	25%	11%	12%
State (181)	22%	24%	22%	16%	15%
All (350)	17%	31%	19%	15%	12%

Table 7 shows the level of awareness of the existing search service by Extension staff, which is maintained by NCREMP at Iowa State University. Sixty-six percent of the 345 respondents who answered indicated they had low awareness of the search service. When

asked how they valued the search service, only 219 out of 350 subjects gave a response, with 38% showing a low value rating, and 35% with a moderate value rating. Table 8 shows percentages of respondents in rating value. Missing values from 131 respondents may have been a result of subjects being unable to rate the value of the search service because they were unaware of it.

Table 7: Level of awareness of the NCREMP search service among respondents

	Low	Moderate	High
County (117)	85%	10%	5%
Area (49)	76%	20%	4%
State (179)	50%	25%	25%
All (345)	66%	19%	15%

Respondents were asked to indicate their satisfaction with the NCREMP search service. Only 142 out of a possible 350 responses were obtained. Again, the low number of responses may be an indication that subjects left this item blank because they were not aware of the search service, therefore could not show satisfaction with it (see Table 9).

Table 8: Value of the NCREMP search service among respondents

	Low	Moderate	High
County (59)	42%	30%	27%
Area 49)	52%	36%	12%
State (135)	34%	37%	29%
All (219)	38%	35%	27%

The alpha coefficient values for awareness, value and satisfaction regarding the NCREMP search service were .7636, .7828 and .8279, respectively. These values are sufficiently high to meet the standards for educational research.

Table 9: Satisfaction with the NCREMP search service among respondents

	Low	Moderate	High
County (35)	43%	37%	20%
Area 12)	42%	33%	25%
State (95)	25%	41%	34%
All (142)	31%	39%	30%

Discussion

1. The Cooperative Extension Service as Information-Provider Today
2. Establishment of an Extension Regional Database
3. Development of a LAN for NCREMP
4. An Online Search Strategy as a Model for Extension

The Cooperative Extension Service as Information-provider today

Extension's redefined mission states that "The Cooperative Extension System helps people improve their lives through an educational process that uses scientific knowledge focused on issues and needs" (Cooperative Extension System Strategic Planning Council, 1991, p. v). While the essence remains unchanged from the original mission, the responsibilities now demanded of Extension personnel have undergone more changes in the last two decades than in the previous 50 years (Evans, 1991). Whereas the Extension agent once served as the main communication link between rural communities and the rest of the world (Dillman, 1986), communications technology today has unquestionably created a global village which does not recognize any artificial boundaries, be they geographical or political (Cooperative Extension System Strategic Planning Council, 1991; Office of Technology Assessment, 1991; Rasmussen, 1989). If anyone doubts that such is the case, one has only to recall how Cable Network News brought the Persian Gulf crisis and the disintegration of the Soviet Republic directly into our

homes as they occurred. "CNN is a telephone party line to the global village..." (de Mente, 1992; p. 6).

Dillman (1986) suggests that the possibility exists for any educational need to be satisfied by reaching beyond local communities. However, two social scientists who have studied communication patterns over a decade state "Although the world may be evolving into a global village, most people still lead local lives..." (Sproull and Kiesler, 1991, p. 116). It comes down to Extension agents having to make the global village relevant to clients. In order to do so, they must have the skills to sift through volumes of information, and the knowledge how to apply whatever facts are uncovered. When faced with such a responsibility, it is no wonder that information anxiety is a factor in their lives.

Restructuring within Extension Service systems has begun in several states in response to changing societal and financial demands. One of the major efforts is in information technology. Important strategic choices regarding information processing systems are being selected and introduced to improve delivery effectiveness. The FACT Report (1991) states "that it is essential for the Cooperative Extension System to reshape its educational program delivery...[so that] both traditional and new communication technologies can be strategically employed in new combinations to deliver high quality educational programming to clients and staff." As part of this initiative, all Extension workers are to be provided with personal access to computer systems that promote the use of Internet services, electronic mail, electronic dissemination of text and availability to remotely located computer databases. Extension professional staff have access to computers and modems for the most part, as Table 4 shows. Trede, Miller, and Quintana (1992) found that 93.6% of Extension professionals in the north central region have computers, and 76.8% are equipped with modems. These researchers suggest that microcomputers may even be considered a traditional technology in Extension today. But they also caution that lack of experience and lack of training may be significant barriers to their expanded use. To lose sight of the training and orientation needed to exploit

electronic information-accessing capability with computers, is to court failure in reaping any benefits from such an investment.

The information that such an electronic networking system can potentially provide has little value unless Extension personnel are willing and able to successfully negotiate their way through a multitude of sources, accessing protocols, and search/retrieval mechanisms (Burton, 1987). They must first know where to look for information that is potentially useful in the performance of their job responsibilities, sort through and select appropriate subject matter sources, understand the correct connectivity commands, and be able to weave their way through search strategies of varying levels of difficulty.

A recent survey by Emery Tschetter, Department Head of Agricultural Communications at South Dakota State University (1991) showed that Extension staff members were interested in using new communications technologies, even though they preferred the more traditional delivery methods of publications and presentations. Sixty percent of the respondents in the survey felt that adequate training was the key to insure that new technologies were accepted and used effectively.

The Extension agent can still serve as an educator and deliver worthwhile knowledge, but how she/he goes about it must reflect the realities of our current society. If an agent served as the principal teacher in the early years of the Extension Service, she/he has now become as much interpreter as teacher (Dillman, 1986). While a lack of awareness and ability to disperse new ideas prompted the formation of Extension 75 years ago, today's Extension agents are responsible for effectively sifting through a tremendous volume of information in order to satisfy clientele demands. One reason for the restructuring of the Extension system is to accommodate the information demands being made upon its agents. Low awareness of the NCREMP database as indicated by questionnaire responses, may point to the need for greater efforts in promoting its existence and use among Extension professionals. Not coincidentally, a low value rating of the search service may reflect low awareness. It's also possible that a low value rating

could also indicate a latent apprehension in being expected to use information-accessing sources such as the NCREMP database.

Understanding assuredly lags behind production in the information-generating arena. One of the unfortunate results of the information age has been the hazy line between having information and having knowledge or, as I see it, having the ability to effectively use information. Paul Kaufman, an information theorist, feels that society's image of information is at fault, in that people confuse the capacity to transmit raw signals with the capacity to create meaningful messages (Wurman, 1989). In reality, the computers that can manipulate information far faster than any human cannot understand the messages they are transmitting (yet). An infatuation with information-oriented electronic tools as ends unto themselves has contributed to this misguided image, hampering efforts to create an atmosphere of positive response in the use of those same tools (Wurman, 1989).

Because the sample selected for distribution of the questionnaire was not statistically randomized, the researcher could not infer from data in Table 6 (use of the electronic mail service offered by the Internet) that all CES employees were not aware of nor have the ability to use the Internet. But given the recommendations of the FACT Committee (FACT Report, 1991) that communication technologies such as the Internet will be an essential part of the organization, the data can serve as a caveat that a significant effort should be directed toward support in training staff for competent use of appropriate electronic communication technologies, such as electronic mail and the Internet.

Establishment of an Extension regional database

The Extension Directors of the north central region (NCR) met in the early 1970's to organize a strategy which would facilitate sharing of educational resources produced by Extension specialists in their states, and help to reduce duplication of effort. In 1976, the North Central Region Educational Materials Project (NCREMP) was established, with a central office

headquartered at Iowa State University, which provided NCR Extension personnel with bibliographic information about Extension materials from those states. Pertinent data was collected from each state to include in a database set up on ISU's mainframe system. A database management program was written so NCREMP staff could generate a hard copy of bibliographic citations in response to search requests.

Sharing of Extension materials among the thirteen NCR land-grant institutions was the impetus for creating NCREMP. Many issues are of common concern in these states and materials produced by Extension specialists in one state may be of value to their counterparts in other states. The NCR Directors had the foresight to realize pooling information about their products would be a logical method of keeping Extension staff and faculty up-to-date about Extension resources developed in other states.

Citations in the NCREMP database cover areas such as agriculture, community development, 4-H, energy, health and nutrition, adult education, family life, natural resources, safety, and waste management. The printout consists of all citations selected by appropriate keywords. A cover letter provides background on NCREMP and directions for ordering copies. NCREMP does not produce or distribute materials. Actual production is carried out by the university of the author. If a search request is related to an unknown topic for which few references have been produced (e.g. bioethics), alternative sources are given which can be contacted for more information on that subject.

Maintaining the database on the mainframe system proved to be increasingly cumbersome and inconvenient. Materials could not be added and updated daily, but only by coordination with computation center scheduling. This resulted in inefficient use of staff time, and frequent charges when modifying and storing data-files. Searches were printed out at the Computation Center, which required physical collection by office personnel. Whenever the university's system was shut down or an error occurred, no processing was possible. In the case of specific failures to the NCREMP program, NCREMP staff were not conversant enough

with the system to make corrections. Consequently, they had to wait until a technical specialist was available to assist with restoring operability of the system.

As the database expanded (it has since grown to more than 12,000 entries) and search requests increased, it became apparent that another arrangement would have to be found to accommodate growth and demands. It was during this time in the mid-80's that microcomputers powerful enough to handle database management programs were financially available to the public. The decision was made to move the data-files to a microcomputer housed in the NCREMP office and create a DBMS program which would be controlled entirely by NCREMP personnel. By 1986, the conversion had been completed. With NCREMP staff in closer control of the computer operation, responses to search requests were processed much more quickly, as well as updating the data-files.

Shortly thereafter, the DBMS was upgraded to Paradox, a relational database management system, with a custom-designed database application using Paradox Application Language (PAL). Paradox was selected because of its reputation as having an intuitive user interface. Menus displayed on the screen are accompanied by descriptions of what they do (Remington, 1991). With training, reports specific to the needs of NCREMP can be constructed and generated by office personnel without continued reliance on a computer program specialist.

Lists of new, revised, or deleted Extension materials have been routinely sent to NCREMP from publication/video distribution offices in each of the participating universities to update the database on a daily basis.

Development of a LAN for NCREMP

As the demands continued to increase, staff workers were becoming less productive because only one of the two office computers could access the database to process searches or update it. In order to more efficiently utilize staff time and equipment, Sorrel Brown, the in-coming NCREMP coordinator wrote and received a grant for Advanced NetWare v2.15 software

from Novell, Inc., the industry standard for networking systems. Installing a network allowed several computers in the NCREMP office to share files and devices in a local area network (LAN). Mark Flannery, a consulting programmer, was hired to facilitate the conversion, and the coordinator was trained as network supervisor (see Figure 4).

Introducing a LAN to the NCREMP office made it possible to increase efficiency by sharing hardware devices such as printers, but more importantly, it allowed more than one individual in the office access to the data-files. A 486/33 Mhz microcomputer served as the host computer, or server, while four other computers functioned as workstations, which can

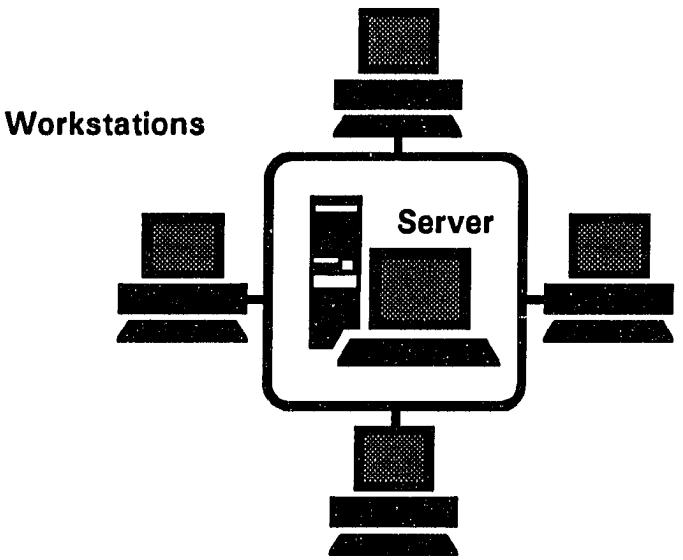

Figure 4: NCREMP local area network (LAN) configuration

simultaneously reach into the main data-files to access appropriate records, then execute DBMS routines depending on the application being run (updating records, searching the database, indexing the keyword list, generating reports, word processing). The next logical step was to reach beyond the geographic limitations of the LAN to broaden accessibility for potential users outside office boundary. Figure 5 shows the physical configuration for online access.

An online search strategy as a model for Extension

DBMS's are extremely sophisticated today and can be adapted to many management facilities, one being search and retrieval strategies (Deogun, 1988). Often such sophistication exceeds that of the casual user. It then becomes the responsibility of the interface to provide a bridge between those strategies and a user who has no concept of data retrieval logic and uses intuitive associations when effecting a search (Eaton, MacDonald, Saule, 1989). As Eisenberg (1983) commented, "... A user when entering through the access mechanism provided by the common interface, sees a single virtual system in which all the complexities ... are hidden; only a

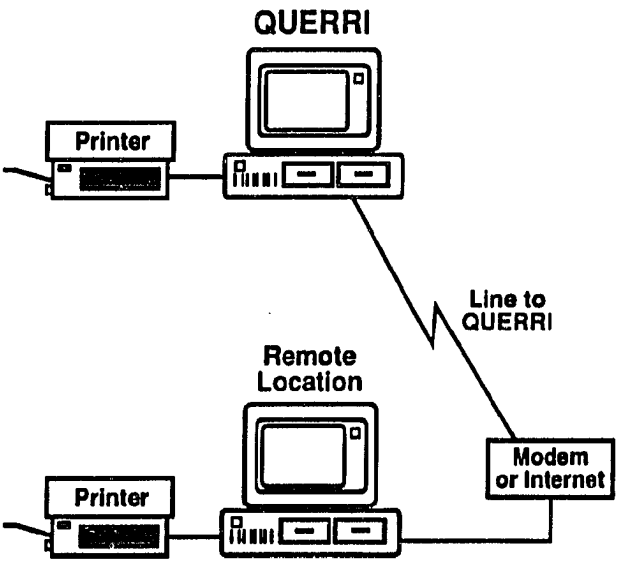

Figure 5: ***QUERRI*** online access physical network design

single, uniform, easy-to-use system is apparent." The only point at which Extension personnel (or computer support staff) must have some technical information in using ***QUERRI*** is when they make the initial connection through a modem or the Internet. Figure 6 charts the actual pathway for a remote caller accessing ***QUERRI***. Once that connection is made, the DOS interface provides the vehicle by which a user negotiates a search.

To humanize the whole endeavor, the researcher created an acronym that would be easily remembered, as well as relevant to the system's purpose. ***QUERRI*** represents **Q**uestions on **U**niversity **E**xtension **R**egional **R**esource **I**nformation. In computer jargon, the term "query" means a request for information from a database. Identifying ***QUERRI*** with online access to the NCREMP database was attention-getting, and represented exactly what function the search strategy performs.

For example, by telneting into ***QUERRI*** through the internet, a call is first sent to the ISU terminal server over an Ethernet connection. Ethernet is the topology that supports terminal emulation, meaning that the PC a remote user is using performs as if it were a terminal directly connected to the ISU mainframe system.

The data (search options) sent by telnet is encapsulated in TCP/IP (Transmission Control Protocol/Internet Protocol), an industry standard that facilitates the integration of multi-vendor networks. The terminal server then translates the encapsulated data going into the Information System Network (ISN) at ISU. The ISN is a packet-switched network set up by AT&T for asynchronous serial communication running at 9600 baud speed.

Once the ISN receives the data, custom ***QUERRI*** software, written in C language to allow asynchronous input and output, lets the remote user's PC use its own communication program to interact with Paradox, the DBMS software that operates ***QUERRI***. Protocols at the remote user end have to be set at 8 data bits, one stop bit, no parity, full duplex, XON/XOFF handshaking. At this point, the data (search options) from the remote user reaches the database on the file server, a 486 microcomputer processor running at 33 megahertz, so that the data-files (bibliographic references) can be searched. All of the above operations are transparent, meaning that none of these linkages are seen by the caller. The remote user does nothing more than log on the internet and dial "querri" to get to the opening screen for ***QUERRI***.

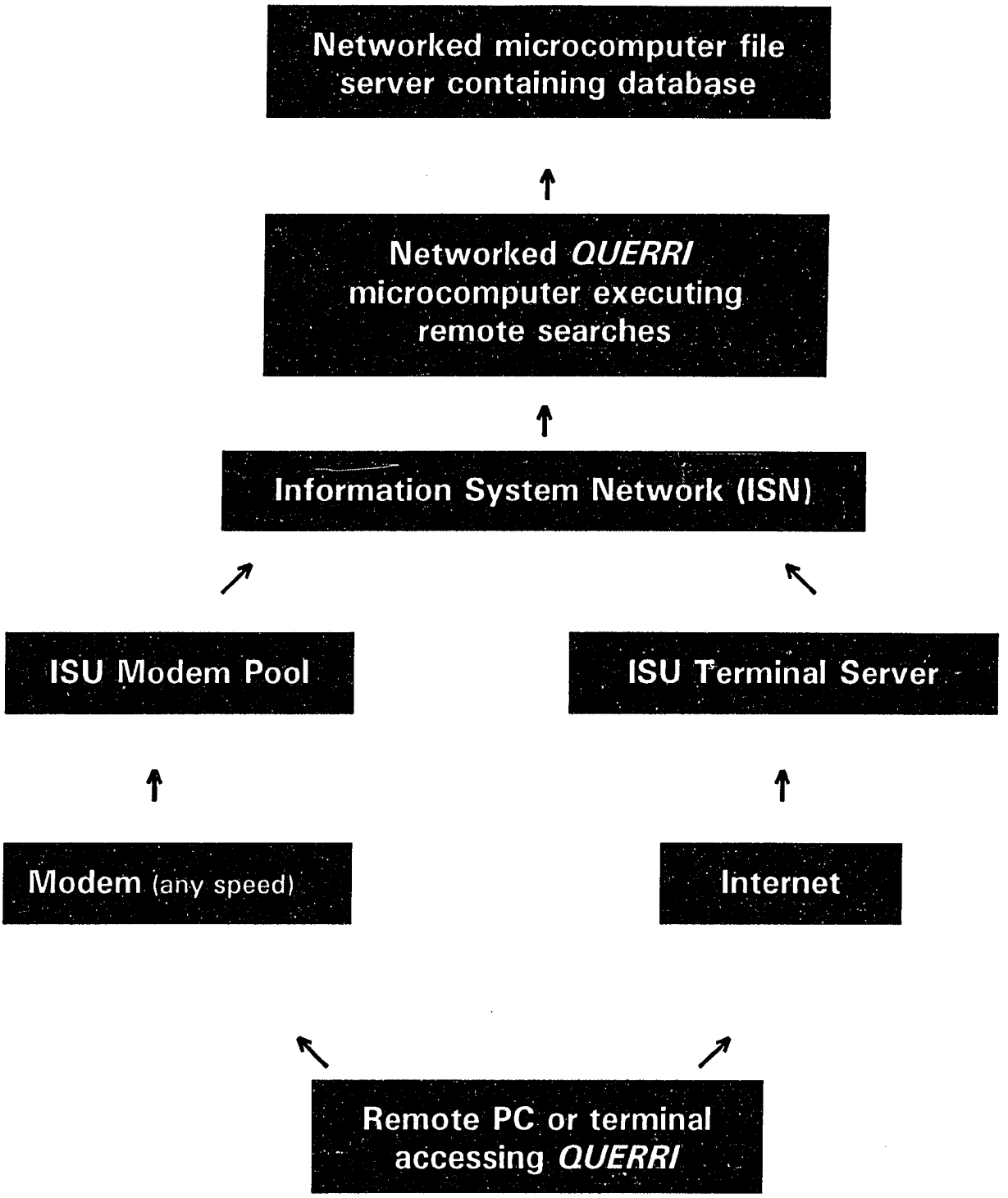

Figure 6: Telecommunication connectivity through Iowa State University for remote access to ***QUERRI*** via modem and the Internet

Once users have connected to ***QUERRI***, the interface leads them through the menus, providing cues, prompts, and recovery mechanisms along the way. Figure 7 is a graphic presentation showing the sequence of screens viewed by users as they negotiate through the search and retrieval process.

The history of the North Central Region Educational Materials Project (NCREMP) and its purpose were included as an option in the opening Main Menu. It also provides operational details, such as the nature of database citations (bibliographic rather than full-text), their availability, and producing institution. A tutorial specific to the NCREMP search and retrieval strategy was constructed and offered as another option. An interesting lesson in the importance of semantics was learned at this point. When the system was first pilot-tested in Iowa with Extension field staff, the first menu choices users saw were defined as:

1) QUERRI Background
2) QUERRI Tutorial
3) Search Menu
4) How to Order Resources
5) Exit

Not one individual who tried the system selected options 1 or 2. They went directly into the Search Menu option. Even though they may have had initial difficulty in understanding some of the idiosyncracies of the system, such as using singular forms of keywords, rather than plural, returning to the tutorial was never a preference. Before the system was field-tested again, the researcher changed the wording of options 1 and 2 in the menu to read as follows:

1) What is QUERRI?
2) How to Use QUERRI

None of the information contained within options 1 and 2 was altered from the time of previous testing. Options 3, 4, and 5 retained the same wording as before. To the surprise of the researcher, with the second field-test, options 1 and 2 were selected and reviewed before users went on to the Search Menu option. As simple a change as altering words persuaded the casual user to investigate those options and perhaps gain additional self-confidence when

initiating an actual search. Other seemingly insignificant changes were made throughout the program to convey this sense of cordiality to users. Since the search strategy targeted CES staff in the initial stages of learning online usage, concern that this approach would inhibit a user from developing greater expertise in search techniques was not relevant.

Examples of the intuitive nature of the strategy were vocalized by field staff who appreciated the fact that use of function keys was NCREMP *not* required to access menu options, help screens or exit out of the system. They felt more comfortable using the alpha-numeric keys for all strategy functions. In addition, they found the format design of the screen which provided details of a particular title to be easy to read and comprehend, with descriptive headings left-justified and corresponding information indented and left-justified immediately following (see Figure 8).

Listing keywords on the detail screen that were already linked to bibliographic references in the database provided a catalyst for users unsure of other related keywords that would retrieve additional references (see Figure 8).

One of the areas that engendered the most frustration in casual and naive users was knowing what to do when the search results were poor (Larson, 1987). To alleviate such a response when a search in ***QUERRI*** results in no references, a message appears that prompts users to use the singular form or check the spelling of the keyword used, or try a broader keyword. In this way, users are not left with a feeling of abandonment when they see that no list of references was generated by their efforts.

It can safely be assumed that with time and experience, Extension personnel will become more proficient in accessing ***QUERRI*** and other online sources of information. To accommodate such a contingency, a greater level of expertise among potential users was taken into account when developing the strategy. Once users become familiar with the logic and pathway of the menu screens, the same menu options that enabled them to easily move through the search strategy with little training, may try their patience. Skilled searchers are likely to want

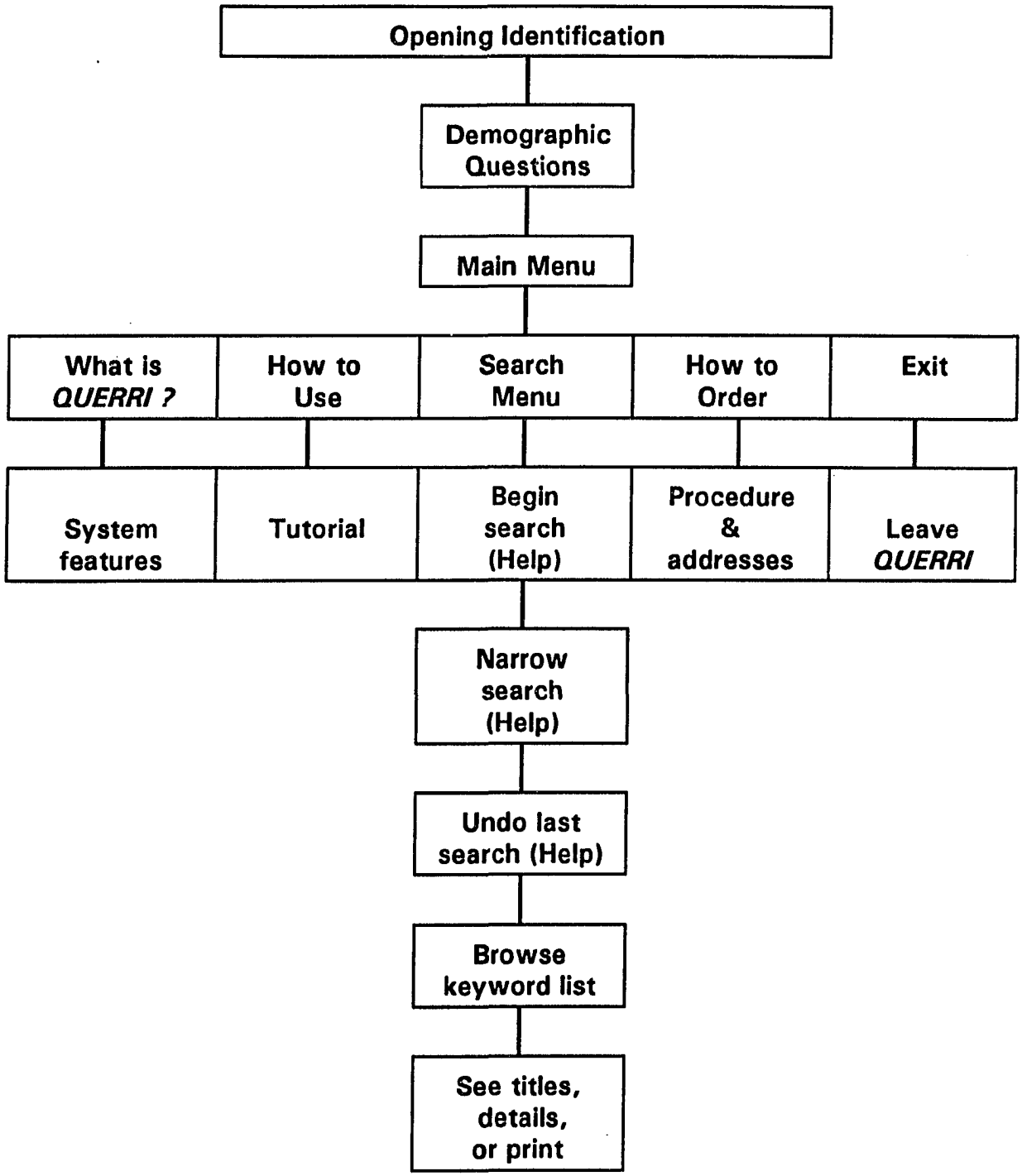

Figure 7: Search options for *QUERRI* strategy as viewed by user

to circumvent the tedious one-by-one choices offered by the menu system. Provisions were made so that options could be incorporated on menu screens throughout the search strategy which will allow the experienced searcher to bypass certain choices and use shortcut commands to more quickly and efficiently advance through a search.

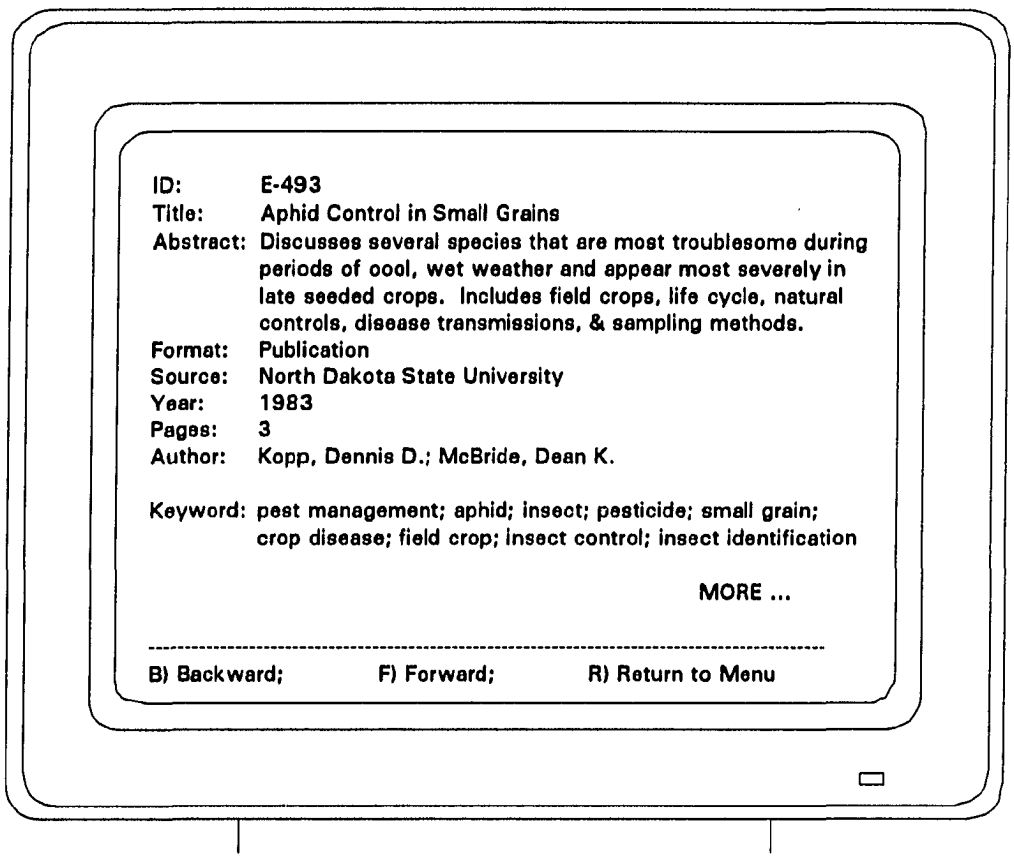

Figure 8: Example of screen describing bibliographic details of a reference

All search options are not necessarily operable at differing stages in a search. A decision needed to be made between two display configurations:

1. Every menu would display all possible choices, regardless of their use at a particular stage in a search. Each choice would be identified with the same number in each menu.

2. Only those options relevant to the current stage of a search would be displayed, numbered sequentially.

The advantage of the first alternative was that each option would be consistently identified with a specific number anytime during the search process. The disadvantage was that the screen display would always include options that were not operable at a particular point in a search. This could possibly result in some confusion to the user, as well as add unnecessary text on the screen. The choice was made to display only those options pertinent to a current stage of a search. In this way, users would have fewer selections to choose from, thereby minimizing anxiety in deciding what action to pursue. Operable choices were numbered sequentially in each menu, and listed in order of their probability of selection, depending on what stage a user was in a search. Thus, if the same option is available in more than one menu, it may be identified with a different number in each menu. Numerical consistency was sacrificed for simplicity. However, "R" was always the choice that returned the user to a previous menu. Interspersed throughout the search and retrieval system are context-sensitive aids, explanations which help to clarify options presented in a particular menu. If a prompt, option, or action is confusing to a searcher, she/he has the option of selecting a Help option in each menu for a more in-depth explanation of alternatives available at that point in the search. Care was taken to ensure that such in-depth explanations did not result in greater confusion. The format utilized provides brief phrases whenever possible, using full sentence explanations only when necessary for clarity. Each concept is centered on the screen, with a line space separating different ideas. Figure 9 is an example of the typical format of a Help screen.

For those menu choices with multiple screens, such as "What is ***QUERRI***," "How to Use ***QUERRI***," and the Help options, <PRESS ENTER> was added as a prompt to the bottom on each screen to expedite progression through the sequence. The search menus all have prompts that are specific to the choices available at that stage.

Because of the limitations in the hardware and software operated by NCREMP, not to mention budget constraints, all desirable features could not be included in the ***QUERRI*** strategy. The system was never intended to be a general purpose query processor. The query

mechanism was limited to keywords, so much less programming overhead was involved in creating the mechanism that processes a search.

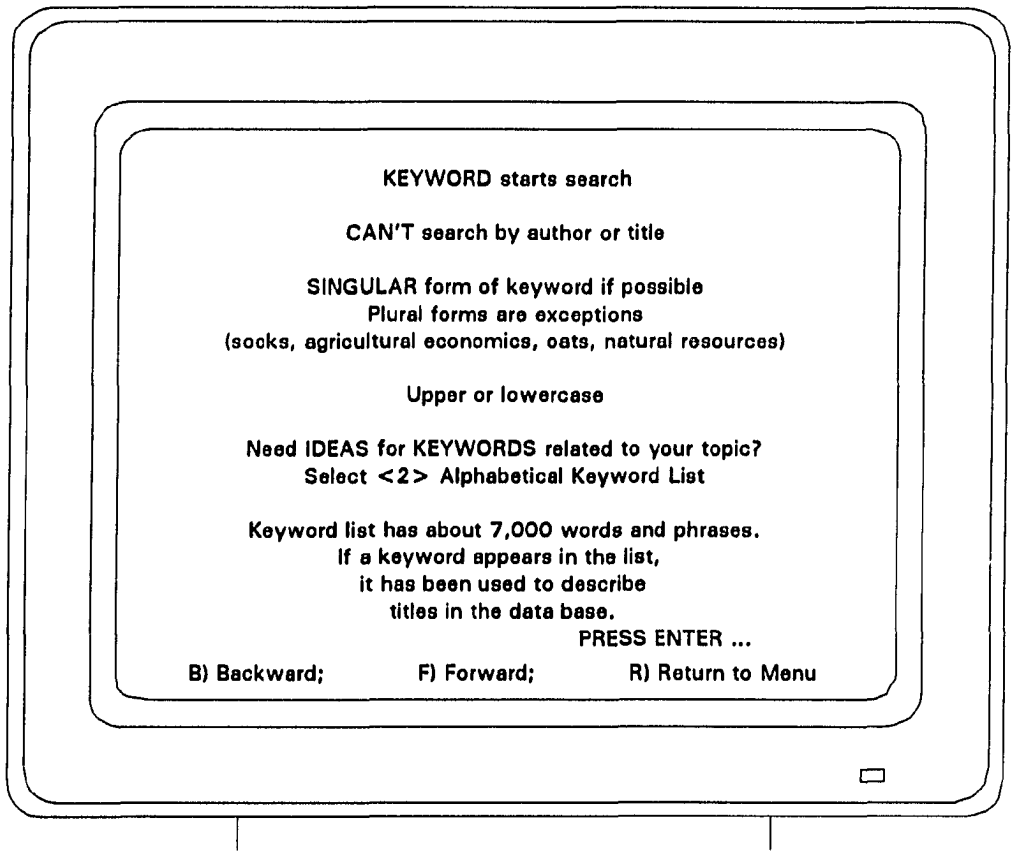

Figure 9: Example of information available in Help screen

Another limitation is the single-user platform. The ISN can now accommodate up to 112 callers simultaneously (14 interface cards with 8 ports per card), but there is only one line into ***QUERRI***. The NCREMP office is already receiving calls from users who have tried to access ***QUERRI*** but are getting a busy signal. And this is after only 4 weeks of being online, with little promotion. Clearly, there is need for further development of the system to optimize its use. Though individuals go through each stage of the innovation-decision process at differing rates, it is safe to say that any judgment concerning adoption or rejection of an innovation is not

instantaneous. With the rapidity of change in electronic technologies occurring today, it is not realistic to expect Extension personnel to make reasoned and well-thought out decisions regarding the use of information access and delivery strategies unless the organization is truly committed to support them. Gross's study (1971) showed that some of the reasons members of an educational environment failed to accept or implement an innovation were because there was a low level of capability within the organization to implement it, materials were unavailable, and members had no clear image about the role that was expected of them.

The restructuring CES is currently undergoing lends itself to perpetuating these failings unless appropriate care is taken to avoid them. Realistic expectations and the ability to attain them are critical to ensure the cooperation of all Extension personnel in adopting and implementing the use of electronic information-accessing techniques (Cotton, 1992). Such were the guidelines used in development of the ***QUERRI*** search strategy:

1. Online access to the database has been made available through either a modem, a tool most Extension county offices are already familiar with, or the Internet, an electronic linkage providing access to many other sources of information that Extension staff are increasingly coming to rely on when addressing the needs of their clientele (DeVries, 1992).
2. Ease of use of an information-accessing technique has been found to be more important than the amount of information expected to be found (Morehead and Rouse, 1992). Focus was always centered on the ***QUERRI*** search strategy as it related to the casual user, not technical wizardry. An intuitive approach for the interface was used in scripting the menus, explanations, and Help screens to emulate the "right-brain" creative approach more often used by the casual searcher (Ness, Jr., 1990).
3. User aids are incorporated into the search strategy offering direct access to search-enhancing options (Eisenberg, 1983). An assumption was made that there will always be naive users who will need assistance when negotiating the search menus. A simple

tutorial, included as an option for such users, can be bypassed by the more experienced searcher, thereby alleviating the anxiety or frustration that may arise from either type of user, respectively. By the same token, on-screen help is available throughout the search process for those users, experienced or otherwise, needing support (Eaton, 1989).

The design of the ***QUERRI*** search strategy is consistent with ES/USDA recommendations from the FACT report (1991) that state "Communication technologies will be an essential part of the future-oriented organization: to facilitate communications in the network environment, to enable our human resources to stretch to reach more people, to lessen the negative impacts of geography ..., and to support timely, flexible approaches to solving problems "just in time"." In developing an electronic online search strategy, it was the intent of this study to focus on the human dimension, by making the process as non-threatening and intuitive as possible. In accordance with Dewey's theories of learning, the ***QUERRI*** strategy was viewed as a tool that enhances, rather than inhibits or controls learning as it relates to online searching capabilities among casual or naive users. As such, it can serve as a model for future designs of search strategies that may be relevant to CES professionals in fulfilling their responsibilities as information-brokers and educators.

CHAPTER V. SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND IMPLICATIONS

Summary

Purpose and objectives

The overall purpose of this study was to refine the existing search procedure which provides bibliographic details on Extension educational resources in a database maintained by the North Central Region Educational Materials Project. A user-cordial search strategy was designed to allow CES staff direct access to the NCREMP database, named ***QUERRI***, from remote locations in order to search the database online. In the process of achieving this purpose, the following areas of investigation were pursued:

1. Identify the level of awareness and value of the NCREMP database among CES personnel.
2. Describe the use of online searching systems.
3. Determine the degree of familiarity and acceptance of computer use and computer-based information searching strategies among CES staff.
4. Develop a user-cordial search strategy for the NCREMP database that would serve as a search model for Extension.

Procedures

A descriptive approach of a qualitative nature was taken in developing the search strategy. The study was concerned with conditions and practices currently existing in CES--the restructuring that is going on, attitudes held by Extension personnel toward electronic information-accessing technologies, expectations in the usage of these technologies, and the effects these expectations have induced.

Selected Extension field and state staff responded to a questionnaire inquiring as to their perception of database searching, specifically the NCREMP search service. Accessibility to computers with modems and use of electronic mail through the Internet was determined.

Various models of information search and retrieval design were investigated before development of the ***QUERRI*** system. Aspects from these models were applied in the design of the search model, as well as pilot-test reactions.

Appropriate LAN and telecommunication linkages through the Iowa State University telephone system for directly accessing the NCREMP database were established.

Questionnaire findings

Responses indicated low awareness and value of the NCREMP search service. Most had access to computers with modems (79%). Only 8% felt their degree of understanding of how to search an online database was high, while 60% indicated low understanding. Almost a third (31%) did not understand the procedure involved in communicating by electronic mail, with only 17% as current users. The mean number of times respondents had searched a database within the last year was 3.3 times. The mean number of times a month they anticipated searching a database in the future was 2.4 times.

Results

Studies documenting principles and designs leading to increased understanding and assistance in information-seeking behavior, proved helpful in providing a basis for development of the ***QUERRI*** search strategy. In order to assimilate desirable characteristics from search and retrieval systems reviewed in the literature, a conceptual framework was formulated before development of the **QUERRI** model. The concept that emerged attempted to simulate the intuitive reasoning processes followed by an individual who is trying to find information for a specific purpose. Based on pilot-test responses from Extension state and field staff in Iowa,

QUERRI was observed to be an effective user-cordial search strategy, whereby casual and naive searchers of online database sources were able to access and retrieve bibliographic citations of Extension educational materials maintained by NCREMP.

Conclusions

The following conclusions have been drawn from development of the ***QUERRI*** search strategy:

1. Limited awareness of the NCREMP search service existed. As a possible consequence, not much value or satisfaction was associated with the service.
2. While accessibility to computers is high among CES professionals, their utilization as information-seeking and retrieval vehicles is low. Not unrelated, the awareness and use of electronic mail through the Internet was also low among the respondents.
3. The search strategy attempted to simulate intuitive sequential search processes. The more intuitive the scripting of menus, the more cordial the search experience, according to verbal responses conveyed during pilot-testing.
4. Choice of language made a difference in the selection of menu options, and in following the steps required to negotiate the search process.
5. Pilot-testing revealed that users preferred trial-and-error efforts in learning a new search strategy, with tutorials and Help screens as optional, not mandatory.
6. Appropriate orientation and familiarization can overcome anxiety-induced attitudes toward adoption and implementation of information-accessing strategies among CES staff, and engender a more receptive attitude toward their use.
7. There is a need for training in information-accessing capabilities to ensure the use of online information sources in a routine manner within CES.

8. The simpler the search strategy, the more likely it will be used. However, this is not to say that procedures, menus and Help screens should be reduced to the level of ambiguity for the sake of simplification.

Subsequent responses by users since ***QUERRI*** went online nationally in mid-May, have substantiated that the ***QUERRI*** search strategy is a cordial searching mechanism for casual and naive users within CES. As such, it can serve as a model for future developments of search strategies for information from electronic sources appropriate for use by CES personnel.

Dewey (1938) posited that it was the business of an teacher or trainer to see in what direction a student's experiences are headed. If Dewey's theories on the importance of experiences as they relate to growth are to be believed, providing a structured tool, i.e., the ***QUERRI*** search strategy, whereby Extension staff appear to have a positive learning experience with electronic accessing of information, is a strong endorsement for the value of designing the tool from the user's perspective.

Recommendations

The ***QUERRI*** search strategy provided a user-cordial mechanism for online searching of a regional database referencing Extension educational materials produced in the north central states. From the experiences of the researcher during development of ***QUERRI*** came the following recommendations:

1. Increase promotional efforts in creating awareness of the NCREMP database and its online accessibility.
2. Ensure that sufficient keywords are identified with each reference in the NCREMP database to cover the probable keywords users may employ when searching with ***QUERRI***.
3. Expand the query mechanism in ***QUERRI*** from just keyword searching to include searching by author, title and state to offer more flexibility to users.

4. During the design phase of an online search strategy, involve potential users at various stages so that the focus remains on developing a useful communication tool targeted at the appropriate audience, not a technical marvel of such complexity that it intimidates the casual user.
5. Be aware of resource restrictions (time, money, opportunity) that may affect training in the use of a search and retrieval system.
6. Have good instructions readily available without elaborate effort on the part of a potentially naive user. One of the selections available in ***QUERRI*** is an optional tutorial that provides straight-forward instruction on its use.
7. When developing a new search and retrieval strategy, continuously monitor research in search and retrieval tutorials in order to incorporate alternatives when appropriate.
8. Construct information-accessing systems so that they can be modified to take advantage of improvements in information search and retrieval strategies. In ***QUERRI***, a user must exit the keyword list to initiate another search. The system can be adapted so that a user could initiate a search from within the keyword list, thereby saving several keystrokes and streamlining the search process.
9. Measure the competency level of potential users before formulating a new search strategy.
10. Where there are identified deficiencies, target design procedures or education to deal specifically with those deficiencies.
11. Anticipate resources needed (time, money, staff assistance) for orientation and training in the adoption and implementation of a search strategy.
12. Apprise those administrators responsible for adoption of a search strategy of resources necessary to successful implementation.

Implications for CES Administration in Implementing Innovations

A reshaping of the information/communication landscape is now in process. Electronic trends are driving many of the changes that are occurring. CES must commit adequate long-term resources to support these changes within its organization with improvements in communication infrastructure, personnel capabilities and skills, in-house training, realistic and clearly outlined expectations, and client-response paradigms.

One of the certainties we can anticipate in the electronic information-accessing field is that constant confusion will accompany the rapid changes that are to be expected. Extension administrators need to be aware that in introducing new information-accessing techniques, stressful periods will arise. Administrators with responsibility in this area must be sensitive to this possibility. If these periods are anticipated and recognized as normal events in the innovation-decision process, then administration must provide the kinds of support Extension staff will need to successfully adopt the desired innovations. Mechanisms and resources must be in place and available to assist personnel when they encounter problems in comprehension, application, and execution. Although Extension staff may start off with positive attitudes toward proposed changes (Tschetter, 1992), frustrations could be a deciding factor in their willingness to implement them (Wright, 1992). These frustrations, if not dealt with by administration, can develop into enough resistance to effectively sabotage successful implementation (Gross, Giacquinta, Bernstein, 1971).

Implications for the Design of Online Search Strategies

Given the growing number of online services becoming available (Directory of Online Databases, 1991, Kurshan, 1990), using training tutorials in information retrieval strategies independent of a particular database does not appear to be a reasonable solution, especially since research has not found their effectiveness to be significant (Eisenberg, 1983). Appropriate training in search skills becomes critical. A frequently-appearing axiom in the literature of online

searching asserts that an individual must do a fixed number of searches a month--15 to 20--in order to maintain search skills (Anderson, 1986). While it may be anticipated that Extension agents will eventually exceed this number in serving their clientele, it is not realistic to assume they will do so in the initial stages of the learning process. Thus it behooves those who are responsible for designing, implementing and presenting instruction in electronic search strategies to "build" models that approach training from the user's perspective. Incorporating a customized tutorial for searching a particular database provides an immediate instructional tool for an individual first accessing that database.

Regardless of how simple a search strategy appears, there are still difficulties in finding just the right search terminology. Information system design must now move to the point where many information sources appear as parts of a single, coherent structure which potential users see on their screen, allowing searchers to bypass a need to understand the various protocols, access instructions, command languages and vocabulary that now exist (Gordon, 1983). Identifying and understanding the constraints confronting individuals as information-seekers will allow better design of the interface between the user and the information system. Not only would such a design offer a simplified access strategy, but it would also alleviate the need to provide source-specific training for users.

Implications to Agricultural and Extension Education Professionals

There is no going back to "the good old days" before the existence of electronic telecommunications. The expectations all educators face today is that they be aware of various information sources and have the technical skill to access and examine them for relevancy to their needs. Whether an educator is responding to a client request or interacting in a more formal teaching environment, she/he must be able to provide information that is up-to-date in order to be regarded a credible source. Educators must guard against developing a defensive attitude toward the use of electronic communications technology. Frustrations and feelings of

inadequacy are to be expected, but failure should be regarded as a step toward better understanding. Acquiring information through the use of electronic technology should be viewed as just another tool to accomplish their mission as educators.

Recommendations for Future Research

Online databases represent an enormous diversity of source information for Extension professionals. However, their value is questionable if accessibility proves difficult. Computer support personnel within each state must design menus that offer their Extension staff easily recognizable pathways leading to online databases from outside their system. Personnel should not be expected to have to recognize or remember many different accessing protocols in order to quickly link up with online databases throughout the country.

Recommendations for future research are summarized as follows:

1. Emphasis should be put on rapid development of a standard, networked communication infrastructure that addresses a common connectivity between state and federal Extension systems.
2. Studies need to accurately ascertain the level of capability among CES personnel in utilizing and exploiting information-accessing systems in serving their clientele.
3. More comprehensive research should be done on effective training methods that provide users with the skills needed to access online databases and negotiate search routines.
4. Identify all factors that may affect the use of online information sources by remote users.
5. Studies should be conducted in expert systems for accessing and retrieving information that provide complete transparency of protocols and procedures, and the use of natural language querying.

Until such time an all-encompassing communications infrastructure in CES is a reality, providing good instruction in the access and retrieval of various information sources is essential for Extension staff who are inexperienced in this area. What is needed is the development of an

"understanding system" devoted to making information accessible and comprehensible (Wurman, 1989) to assist in the acquisition and interpretation of the data that increasingly directs people's lives. Considering that CES is an information processing system, and that its agents are increasingly being regarded as reference information resources (Browning and Anderson, 1989), their ability to reach out and retrieve information is critical to the successful fulfillment of their responsibilities.

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APPENDIX A: DEMOGRAPHIC INFORMATION REQUESTED BY *QUERRI*

Please answer the following questions.

State (two letter abbreviation)?

Country?

1) County
2) Area/District
3) State
4) Other Extension
5) Non-Extension

Extension position (enter appropriate number)?

[If response is #5, then user is asked to indicate affiliation.]

1) Private individual
2) University
3) State Agency
4) Industry
5) Other

Affiliation (enter appropriate number)?

1) Agriculture
2) Natural Resources
3) Home Economics
4) 4-H and Youth
5) Community Development
6) Other

Subject area of search (enter appropriate number)?

[If response is #6, then user is asked to indicate topic.]

Describe your topic (in a word of two):

Thank you!

APPENDIX B: MENU SCREENS FOR *QUERRI*

MAIN MENU [This menu is displayed after demographic questions have been completed].

---

1) What is QUERRI?
2) How to use QUERRI
3) Search Menu
4) How to Order Resources
5) Exit

Select option (1, 2, 3, 4, or 5):

SEARCH MENU [This search menu is displayed when user selects #3].

---

1) Begin NEW SEARCH with Keyword
2) View Alphabetic List of ALL KEYWORDS
3) Help
R) Return to MAIN MENU (Instructions, How to Order, Exit)

Select option (1, 2, 3, or R):

SEARCH MENU [This menu is displayed after a keyword has found citations].

---

1) List TITLES found
2) NARROW SEARCH with Keyword
3) Begin NEW SEARCH with Keyword
4) View Alphabetic List of ALL KEYWORDS
5) Help
R) Return to MAIN MENU (Instruction, How to Order, Exit)

Select option (1, 2, 3, 4, 5, or R):

SEARCH MENU [This menu is displayed if a keyword does not find any citations].

---

1) UNDO Last Search
2) View Alphabetic List of ALL KEYWORDS
3) Begin NEW SEARCH with Keyword
4) Help
R) Return to MAIN MENU (Instructions, How to Order, Exit)

Try a broader keyword,, use singular form, or check spelling.
You may want to view the keyword list for more ideas.)

Select option (1, 2, 3, 4, or R):

SEARCH MENU

[This menu is displayed after a search has been narrowed by another keyword].

---

1) List TITLES found
2) UNDO Last Search
3) Begin NEW SEARCH with Keyword
4) View Alphabetic List of ALL KEYWORDS
5) Help
R) Return to MAIN MENU (Instructions, How to Order, Exit)

Select option (1, 2, 3, 4, 5, or R):

[This list is displayed when List Titles Found is selected. Titles are shorten here for the sake of brevity].

PESTICIDE found 290 titles

---

1 Aphid Control ...
2 The Extent and Nature of ...
.
.
.
15 Insect Control on ...

Line #) View Individual Title; F) Forward; R) Return to Search Menu

---

Select option (Line #, F, or R):

[This information is displayed when a line number is entered].

ID: E-493
Title: Aphid Control in Small Grains
Abstract: Discusses several species that are most troublesome during periods of cool, wet weather and appear ...
Format: Publication
Source: North Dakota State University
Year: 1983
Pages: 3
Author: Kopp, Dennis; McBride, Dean
Keyword: pest management; aphid; crop disease; field crop; insect; insect control; pesticide...

F) Forward to next title; P) Print Suggestions; R) Return to Title List

Select option (F, P, or R):

COMPLETE KEYWORD LIST

[This message is displayed when user selects the option to view keyword list].

This option allows you to see keywords QUERRI uses to search for titles. It has nothing to do with the keyword you may be currently using. It is included simply to help stimulate ideas for keywords.

Enter a keyword to look up:

[After a keyword is entered, the position of that word in the keyword list is located. Example: pesticide].

```
     pest control
     pest identification
     pest management
 ==> pesticide
     pesticide application
     pesticide applicator
     pesticide container
     pesticide disposal
     pesticide label
     pesticide law

---------------------------
1)  Scroll Backward in List
2)  Scroll Forward in List
3)  Look up Another Keyword in List
R)  Return to SEARCH MENU (Exit Keyword List)
---------------------------
Select option (1, 2 , 3, or R):
```

APPENDIX C: NCREMP SEARCH EVALUATION FORM

Name _____ 87 _____ *State* _____

Mailing Address _____

North Central Region Educational Materials Project (NCREMP) Evaluation

Services currently provided by NCREMP:

Computerized search of a north central extension bibligraphic data base
Quarterly Update lists all new state & north central region extension resources entered in data base the previous quarter
Regional review of extension educational materials produced by NCR Extension specialists & reviewed by regional Ext. specialists
Electronic mail transfer of search requests and responses

Please answer by checking the box(es) that best fit(s) your response.
Thank you for your cooperation.

1. What **level** is your position?

   ☐ County
   ☐ Area/district
   ☐ State

2. How do you allocate your **time** among:

	% Time
Home Economics	_____
4-H & Youth	_____
Agriculture	_____
Natural Resources	_____
Community Development	_____
Information Services	_____
Administration	_____
Other _____	_____
	100%

3. Check the **national initiative(s)** that relate to your work:

   ☐ Food Safety and Quality
   ☐ International Marketing
   ☐ Revitalizing Rural America
   ☐ Sustainable Agriculture
   ☐ Waste Management
   ☐ Water Quality
   ☐ Youth at Risk

4. As you conduct your Extension responsibilities, how many times in a typical month do you **seek information** from ...

Libraries	_____
Ext. specialists	_____
Ext. field staff	_____
Univ. faculty (non-ext.)	_____
Private/public agencies	_____
USDA agencies	_____
Other ext. services	_____
Other _____	_____

5. What **additional sources** of information would be beneficial?

   _____

6. Please rate your **degree of awareness** of services provided by NCREMP (see box above).

	Low	Moderate	High
Computer searches	☐	☐	☐
Quarterly Update	☐	☐	☐
Regional review	☐	☐	☐
Electronic mail	☐	☐	☐

7. Indicate how you became aware of NCREMP:

   ☐ promotional brochure
   ☐ NCREMP state contact
   ☐ NCREMP coordinator
   ☐ colleague
   ☐ meeting
   ☐ other _____

APPENDIX D: QUESTIONNAIRE ON COMPREHENSION AND USE OF SEARCH STRATEGIES BY CES

NCREMP Search Results Evaluation

Directions: *Please complete this brief evaluation and return as soon as possible. Your comments can help improve and support the search service.*

Name: Elden R. Everhart
Address: Iowa State University, Atlantic, IA 50022
Topic: pruning shrubs
Date: 4/03/1992
* Keywords: pruning, pruning practices, pruning shrubs, shrub, shrub selection, shrub planting, hedge, hedging, bush, deciduous shrub

1) Did the references listed by the search results fulfill your request?

- ☐ YES
- ☐ SOMEWHAT
- ☐ NO

a) If not, please indicate why:

- ☐ keywords used by NCREMP too narrow *
- ☐ keywords used by NCREMP too general*
- ☐ not enough references in data base
- ☐ other _____

_____

_____

2) Preferred access method to request searches:

- ☐ postal mail
- ☐ telephone
- ☐ FAX
- ☐ your state contact
- ☐ e-mail (J2.NCR@ISUMVS.BITNET)
- ☐ other _____

3) Was the method you used to request the search satisfactory?

- ☐ VERY
- ☐ SOMEWHAT
- ☐ NOT REALLY

a) If not, because _____

_____

4) Did you receive the search results within the time you requested?

☐ YES ☐ NO

a) If not, how long after your request date did you receive the results?

_____

5) If you had personal contact with a representative of NCREMP, who was it with?

- ☐ your state contact
- ☐ NCREMP office personnel
- ☐ other _____

a) Was the contact satisfactory?

- ☐ VERY
- ☐ SOMEWHAT
- ☐ NOT REALLY

b) If not, please explain: _____

_____

_____

6) General Comments _____

_____

_____

Mail to: *NCREMP*
B-10 Curtiss
Iowa State University
Ames, IA 50011
(515) 294-8802

9/90

8. Please rate the **value** of NCREMP services in your current position?

	Low	Moderate	High
Computer search	☐	☐	☐
Quarterly Update	☐	☐	☐
Regional review	☐	☐	☐
Electronic mail	☐	☐	☐

9. Please rate your **degree of satisfaction** with NCREMP services.

	Low	Moderate	High
Computer search	☐	☐	☐
Quarterly Update	☐	☐	☐
Regional review	☐	☐	☐
Electronic mail	☐	☐	☐

10. Has the *Quarterly Update* been **helpful** to you specifically in ...

☐ locating specific resources
☐ becoming aware of new materials
☐ becoming aware of currently available resources
☐ other _____

11. Describe your **access** to a computer:

☐ your own
☐ in another office
☐ not available

If you have access to a computer, does it have a **modem**?

☐ Yes ☐ No

If you do *not* have access to a computer now, do you expect that you will

☐ within next year
☐ within the next 2 years
☐ not in the near future
☐ don't know

12. How many times have you **requested** a computer data base search from *any* source in the last year?

☐

13. Please rate your **degree of understanding** of how to search a computer data base system.

☐ None
☐ Low
☐ Moderate
☐ High

14. Is your main **reason for searching** a data base

☐ to locate specific resources
☐ to become aware of new materials
☐ to become aware of available materials
☐ for program development
☐ curiosity
☐ other _____

15. Assuming you have access to a computer, how many times a month would you search an **on-line data base** of extension materials from north central states?

☐

16. Have you used **NCR extension resources** in the past 3 years (materials that have been reviewed & approved by NC extension regional specialists)?

☐ Yes ☐ No

If yes, it was

☐ for distribution to extension clients
☐ for reference by professionals
☐ for preparation of instruction
☐ for ideas of potential program development
☐ for program planning
☐ for answering questions from clientele
☐ for keeping up-to-date in my area of expertise
☐ for getting in touch with extension colleagues
☐ other _____

17. Concerning **electronic mail** (E-mail) use on INTERNET, you

☐ are a current user
☐ would use if computer was available
☐ would use if had other E-mail addresses
☐ would use if understood procedure better
☐ would use if had the time
☐ don't use because too impersonal
☐ don't use because lack typing skills
☐ don't use, but plan to in future
☐ don't have access to INTERNET connection
☐ are not aware of this method of communication
☐ other _____

My E-mail address is _____

18. How would you like to receive **additional information about NCREMP** services (such as electronic mail procedures, direct access searching on-line data bases, regional resource review, and other benefits)?

☐ Promotional brochure
☐ Personal contact with NCREMP representative
☐ Videotape
☐ 800 phone number
☐ Electronic mail
☐ Other _____

Return to:

NCR Educational Materials Project
B-10 Curtiss Hall
Iowa State University
Ames, IA 50011
(515) 294-8802