Problem Solving, Creative Librarianship, and Search Behavior

Diane Nahl-Jakobovits and Leon A. Jakobovits

To understand how knowledge functions in society one needs to study social cognitions, or how people process information when solving problems. Librarianship has a dual interest in problem solving that involves creative librarianship and search behavior. Today's technological environment is constantly challenging librarians and patrons to devise new assumptions and solutions to address their needs. Problem solving as a subject offers principles, techniques, and new research domains to meet this challenge.

wo decades ago Jesse Shera proposed a revolutionary self-redefinition of librarianship: the study of social cognitions, or how knowledge functions for individuals and society as a whole.[1] He suggested *social epistemology* as the name for this new perspective on "knowledge about knowledge." For some librarians this signaled a new, central concern with how society achieves a "perceptive relation to its total environment." While Shera was making his remarks in the 1960s, at M.I.T. Noam Chomsky was bringing about a revolution in linguistics by redefining it as a "branch of cognitive psychology."[2] The science of linguistics became the study of what native speakers collectively "know about their language," their "linguistic intuitions" or "cognitive processes" (i.e., their linguistic problem-solving behavior).[3] Chomsky's Cartesian epistemology grounded in rationalism is clearly related to Shera's insistence that librarians must "understand the cognitive processes of society," or how people make use of knowledge to solve problems.[4] Chomsky married linguistics to cognitive science while Shera saw librarianship as a behavioristic science primarily concerned with the "utilization of the social transcript by human beings individually and collectively." Both put the user's problem-solving activities at the center.

Linguistics has since completed its revolution and has proceeded through various phases of development.[5] Something very different has happened in library science, where a nonepistemological revolution in technology has broken out, threatening to shift the focus of librarians from cognitive processes of users to managerial concerns regarding library automation. Given that librarians have "embraced technology more rapidly and more successfully than many other fields," cautious voices are asking whether "the embrace has been too strong."[6]

In an editorial, Charles Martell frankly expresses a feeling of malaise, even confusion, about the increasing managerial complexities of library automation.[7] He notes that the "new dramatic trends in the information world" require a response that goes beyond coping. "Creative responses" are needed to challenge the as-

Diane Nahl-Jakobovits is Lecturer in the School of Library and Information Studies and Information Support Librarian at Hamilton Library and Leon A. Jakobovits is Professor in the Department of Psychology, University of Hawaii, Honolulu, Hawaii 96822.

sumptions that form the "historical basis of librarianship." Should we continue thinking of information as "static" messages deposited in books on shelves, or should we try to establish a "base of dynamic information" that "might be organized at the time it is needed to help the user solve a problem?"

The call for creative behavior in libraries envisions more than coping and adjustment. Deborah Jakubs urges us to "do more than keep up with change; we should anticipate it and initiate it."[8] This implies a change in the "internal and external image of the librarian." We need to separate ourselves from the image of a passive profession, and combine management and analytical skills with technological foresight. While routine problem solving tries to cope with existing assumptions, creative problem solving invents new assumptions. The following three examples will illustrate this contrast.

- *Static versus Dynamic Software Systems.* The current model in online catalog systems is static in the sense that a software-hardware package is chosen. Glitches are monitored and, if serious, corrected. Users are stuck with the problems and weaknesses of the system. When administratively feasible, changing software merely recycles the static process with a new system. Through creative problem solving, librarians and information specialists could contribute to the development of dynamic software systems that, like self-cleaning ovens, have the built-in capacity for self-modification. Instead of remaining the same until replaced, online catalogs could improve themselves as they are being used. User errors and preferred styles of searching could be tracked and could serve as feedback or input data guiding modifications and expansions. Like good wine that continues to improve with age, a dynamic online catalog should improve cumulatively the more it is used by a variety of patrons.
Independent Storage and Retrieval Languages. The current model in information science is based on the assumption that retrieval of information is second-

ary to storage. The latter is given the primary role through the use of controlled vocabulary. "Storage categories" are formalized as hierarchical classes of subject headings called a classification scheme. In this model the problem of retrieval becomes the problem of helping users acquire the categories of the control language specified by an appropriate thesaurus. The burden is on the user to know these categories or to forego access to the information. The development of retrieval systems or languages independently of storage systems might be a creative problem-solving approach to which librarians can contribute.

"Retrieval systems designed independently and creatively according to the cognitive processes of patrons and their problem-solving styles are necessary."

Storage categories, such as those comprising the Library of Congress classification, have evolved in response to problems faced by catalogers who must label the new textual material. The characteristics of the cataloger's cognitive processes are not necessarily the best and most relevant for the user. Instead, retrieval systems designed independently and creatively according to the cognitive processes of patrons and their problem-solving styles are necessary. This implies that a translation is possible between storage and retrieval systems that are developed independently. The possibility and efficiency of such an interdependence need to be researched.

Librarians and Professors Exchange Places. The old model has evolved into a routine, unquestioned expectation regarding librarian-professor relationships: librarians are generalists who know about the location of information while professors are experts who know the information in a field. The contrast here is between *knowing about knowing* (the librarian) versus *knowing* (the scholar).

This model leads to the idea in library education that the preparation of librarians should include majoring in an academic discipline to acquire a deeper *knowing* and to facilitate communication with scholars.

There are several alternative ways of conceptualizing the librarian-professor relationship. One is to train librarian professors. This encourages library students and graduate students in other fields to acquire a dual master's degree or Ph.D. Another idea is to facilitate midcareer switches by making available a re-threading program, a shortened version of a regular program, used by those who already have a graduate degree in a field. Librarians could be given release time or sabbaticals to enroll in such programs, and professors could enroll in a graduate library program. When they finish, they could exchange places. Additionally, professors might work as volunteers in the library, according to their experience or knowledge. Librarians can be given new job descriptions that allow them, like professors, time and facilities for writing and research.

PROBLEM SOLVING AND SEARCH BEHAVIOR

The future of librarianship is inextricably bound to the course of science. Library science and the behavioral sciences are visibly allied in a common focus on the library user. Librarians, psychologists, and linguists share an intense interest in social cognitions: their origin, structure, and use. Information has a physical and a rational component. The physical relates to engineering and marketing issues of human-machine interfaces: storage and retrieval, hardware and software, cost-benefit and systems analyses. The rational aspect relates to human issues and cognitive processes, to meaning and problem solving: coverage, scope, relevance, need, satisfaction, and difficulty level.

Librarians as creative scientists can make unique contributions through their ability to unite these two features of information. The study of user behavior is central to all librarianship, in both the technological and humanistic aspects. The librarian's interest in search behavior overlaps with the psychologist's interest in problem solving and the information scientist's interest in decision making.

Problem solving has been studied in psychology and education from two perspectives: conditioning and insight. Do we learn by being rewarded for responses to stimuli, or do we learn by looking deeply and understanding? Are drilling and rote memorization more important than teaching generalizable principles? Educational practice today incorporates both approaches.[9] Gestalt theory on perception and human reasoning has revealed that information in memory is organized in chunks embedded within chunks, forming hierarchical clusters that can be unpacked into subordinate units during recall.[10]

These ideas were further elaborated upon and applied by Allen Newell and Herbert Simon in their work on computer simulation of human problem solving.[11] Libraries and personal information systems are designed on the assumption that users can evolve into independent searchers able to execute successful problem-solving search strategies. The library research or search behavior process is the recurrent, lifelong activity whereby information needs arise, are translated by the individual into searchable queries, and are pursued through the formulation and execution of search strategies that yield answers to fulfill needs. There are thus three broad components of library research: information need, search strategy, execution of strategy.

The structural components of search strategies are executed in a sequence or flow that permits revision on the basis of feedback or new input. Problem-solving activity is composed of these structured steps, including

1. clarify the question;
2. identify the source for finding information;
3. translate question into the words of the source;
4. conduct the search;
5. locate the materials.[12]

When these steps are analyzed it can be seen that each requires its own problem-

solving steps. For example, conducting the search (step 4) might require the strategy of using periodical indexes. This includes the following steps:[13]

1. decide on search terms;
2. select the right index;
3. look up subject in index, most current first;
4. list articles on index cards (title, author, journal, volume, date, and pages for each article);
5. check the serials record;
6. locate by call number.

Search behavior is a problem-solving activity in which subskills are organized and retrieved according to the individual's perception of a current information need. As information specialists we need to understand how people discover, decide on, and execute search strategies that work, as well as what leads to errors and unproductive strategies.

THE PSYCHOLOGY OF SEARCH BEHAVIOR

Learning theorists concur on one basic point, namely, that motivation plays an important role in problem solving.[14] Teachers know that students are motivated to work harder when the grading is tough. Successful managers use incentives such as money, privileges, and awards as tangible motivators to energize employees into better problem-solving activity and critical thinking. Problem-solving activity is driven by the motive to attain a goal that one finds rewarding. Search behavior is primarily goal-directed problem solving. The information need or goal provides the *affective* interest or motive: a desire to know, an attraction to a topic, the desire for mastery, a willingness to obey instructions, and others. The search strategy provides direction and planning for the *cognitive* decisions: knowledge of sources and tools, organizing notes, judging some information as relevant, choosing between courses of action. The execution of the strategy provides the *sensory and motor* acts that net the information with its enjoyments and rewards: the style of execution, the errors committed, the presentation of the product in a report. Thus, a three-way correspondence exists between the three components of library research (information need/search strategy/execution), and the three domains of human behavior (affective/cognitive/sensorimotor).[15]

The searcher's affective state or information need is personal, subjective, and manifests behaviorally in a variety of ways. The searcher's cognitive problem-solving state corresponds to the act of formulating a search strategy. Though intrapsychic, this form of mental activity is objective, because the internal reasoning process must match the external standard logic of information tools. When the intrapsychic cognitive acts are objectified in this way, the search will be productive. The searcher's sensorimotor activity corresponds to the execution of the search.

"Librarians should be as much concerned about people's abilities to process information as . . . about people's abilities to find it."

TEACHING SEARCH BEHAVIOR AS PROBLEM SOLVING

From the comparison of general problem-solving skills to search behavior, some library instructors have concluded that "library use skills are study skills."[16] David Fraser suggests that "counseling study habits is one of the fundamental concerns of the profession."[17] He points out that "the use of libraries for memory work has gradually placed a special educational responsibility on librarians—that of 'tutor' or 'learners' advisor.' "[18] The concern for teaching better information-processing skills appears closely connected to the concern for teaching better problem-solving skills, better study skills, and better critical thinking, reading, and memory strategies. Search behavior involves not only finding information but processing it as well. This suggests another dual focus for information specialists, as suggested by Fraser: "Librarians should be as much concerned about people's abilities to process information as . . . about people's abilities to find it, especially if we intend to tutor and ad-

vise learners on their approaches to studying.''[19]

An application of this view can be found in Mary Reichel's attempt to apply Jerome Bruner's theory of instruction as a framework for bibliographic instruction.[20] Bruner emphasizes three major features in teaching: predisposition to learning, which is an affective component; structure of materials and their sequencing, which are cognitive components; and reward or punishment, which are sensorimotor components. To improve the affective component Reichel tells students *why* they need to have library skills and assigns hands-on exercises for learning them. To improve the cognitive component, students are provided organizational systems for searching the library. These involve superordinate and subordinate categorizations of search principles and procedures.

Generalizing procedures is emphasized to maximize transfer of principles to a variety of tools and approaches. This increases the "manipulability of the knowledge." For example, reference sources are discussed in terms of their categories of information (dates, addresses, definitions, biographical details, and so on). Similarly, search strategies are discussed in terms of conceptual frameworks such as the guided design approach, or the browsing versus the systematic literature searching approach, or the citation patterns approach. To help promote better critical thinking and problem solving in search behavior, Reichel provides an intellectual context that details the process of creating and using knowledge, namely, scholarly documentation practices, disciplinary overlap, professional communication, primary/secondary sources, and scope/breadth/depth of content.

Reichel's approach emphasizes the teaching of general principles to insure transfer of knowledge and critical thinking. Susan Deese employs an analytic approach to library use instruction, concentrating on the subcomponents of general activities to insure that basic or elementary skills are built up sufficiently.[21] She provides an inventory of subskills involved in common information-processing activi-

ties, divided into nine groupings:
1. Listening skills (17 subskills given)
2. Reading skills (19)
3. Library sources skills (14)
4. Recording skills (13)
5. Critical-thinking skills (12)
6. Organizational skills (13)
7. Synthesis skills (13)
8. Memory skills (7)
9. Use skills (15)

The list of more than 100 skills is not exhaustive and will expand with further research. A classification scheme that would provide a theoretical framework for managing library use skills is clearly needed.[22] Inventories of skills and errors should illustrate the hierarchical nature of complex problem-solving skills. Analysis of an activity reveals many of its subcomponents. Understanding the interrelationship of library skills can be useful to librarians. For example, consider the familiar steps one goes through when taking notes while reading:

(1) *verbalizing echoically* or reading subvocally as a strategy to enter it in memory as one would enter a sequence of keystrokes on a computer;

(2) *paraphrasing* phrases and sentences as a strategy to decode the meaning of the text or translate it into one's own language;

(3) *formatting* the notes by marking or copying selected passages of text as a strategy to outline the overall argument;

(4) *reflecting* on the content by reacting to it cognitively (thinking about implications) and affectively (agreeing or disagreeing with its assumptions);

(5) *organizing* the notes to form a reasonable and self-contained thesis, supportable by evidence and precedence;

(6) *memorizing* details by linking them to prior knowledge or mentally rehearsing them;

(7) *applying* the new information to an old problem or contextualizing it, as a strategy to gain a new, enhanced perspective;

(8) *using* the information wherever it can guide decisions and affect one's attitudes.

Teaching better problem solving in complex intellectual tasks is a common con-

cern in education. The rationale for providing training in problem solving is that common mistakes can be identified in advance and thereby avoided. We use this assumption in our bibliographic instruction efforts by giving students lists of frequently committed search errors, for example:

Common errors in copying call numbers:
- not copying exactly;
- copying the first line only;
- leaving out punctuation;
- changing the order of the lines;
- writing illegibly.

Common errors in using the card catalog:
- not knowing the main categories of the classification;
- not remembering that it lists no acquisitions after 1979;
- not knowing the first word of a title one is looking up;
- alphabetizing incorrectly due to inattention or haste;
- having the wrong spelling for a name or title word;
- searching with the feeling that it's not there;
- assuming without verifying that the library has nothing on a topic;
- assuming without verifying that a book probably won't be there or that it is missing.

In addition to alerting searchers to expected mistakes, it is desirable to discuss with them the source or origin of errors. These are in the affective domain because they reflect deeper inadequacies in one's basic problem-solving routines and may require special attention or occasions for relearning. For instance:

Common sources of errors in searching:
- insufficient attention to detail and order;
- illegible handwriting;
- always rushing or feeling time pressure;
- frequently doubting and panicking;
- insufficient motivation to be innovative in information seeking.

Searchers should become aware of how their general habits can influence their library research efforts.

PROBLEM-SOLVING PROTOCOLS

The use of modeling techniques that involve exposure to *thinking aloud search protocols* is an intriguing possibility for library instruction. Psychologists and educators have used the technique to improve the problem-solving abilities of clients and students whose cognitive and affective skills are deficient.[23] The investigation of search behavior protocols and their use for library instruction is a new, promising area of research. Here is an example of a search protocol produced by an experienced patron who was talking into a tape recorder while locating several books by their call numbers.

Okay. Looking for 668 . . . 670, 671 . . . must be down here. I'll go down here. C57, C57. Books that haven't been taken out in a long time . . . Let's see. Hmmm doesn't seem to be here. *The Foundations of Education for Librarianship* doesn't seem to be here. It's S54. It's supposed to be HERE. . . . This is S46. Could be missing. . . . That wasn't one we were really looking for. That was just one that we thought we'd look at. . . . But I hope we do . . . find it some day. Okay (sigh). Then we need S66 with a Z665 . . . S42 . . . 665. . . . Oh there it is. An old one. *Libraries and the Organization of Knowledge.* . . . There is his other book, *Knowing Books and Men: Knowing Computers Too.* Hmmm. *The Compleat Librarian.* That's also his book. What's this *Teaching Yourself in Libraries?* I've seen that one. *Strategies of Public Policies of Informatics.* Okay . . . And the last one is BD. It's on the second floor. So let's go to the second floor.

This protocol segment reveals various types of common problem-solving strategies people may use when locating books. Some examples:

(1) verbalizing the parts of a call number in order to match it with the call numbers on the books (e.g., "Looking for 668 . . . 670, 671." or "Then we need S66 with a Z665 . . . S42 . . . 665");

(2) stating the conclusion of a reasoning process ("must be down here" or "could be missing");

(3) browsing titles of possible interest and noting their potential relevance for the future ("Hmmm. *The Compleat Librarian.* That's also his book. What's this *Teaching Yourself in Libraries?* I've seen that one");

(4) using self-regulatory sentences ("I'll

go down here'' and ''So let's go to the second floor'');

(5) orienting to a new subsequence in the search flow (''Okay . . . Looking for 668'' or ''Okay . . . and the last one is BD'').

Inspection of the above protocol reveals two important features of problem-solving activity. First, it generates discourse just as a dialog does, one statement prompting another. Second, the stream of self-talk is simultaneous with sensorimotor activity (walking, reading, matching) and is objectively relevant to it.

Additional understanding of the nature of problem-solving in search behavior may be gained from the protocol analysis of a Danish librarian's verbalizations during a search. The query was ''Which marking scale is used in the assessment of (technical) draughtsmen?'' The fragment quoted is accompanied by the following sequence of actions: reads and considers the query; selects a source; walks to its location; looks up the subject heading of the query; not finding it, decides on a related source:[24]

'Which marking scale is used in the measurement of technical draughtsmen?' Yes then I in the first place rather have to find out which . . . training the draughtsmen get, ehh which high school they consult. I don't know that immediately . . . and ehh that I think I will look up in Erhvervskartoteket in . . . Erhvervskartotekets' index . . . one can look up on technical draughtsmen . . . but that article is not on its place . . . I try the other Erhvervskartotek.

Note the basic similarities between the two protocols just presented, despite differences in culture and task. The similarities of human problem solving across cultures and topics surely arises out of an individual's struggle with and adaptation to common problems in an objective environment. Search strategies are constrained within the limits of the information system and the individual's acquired problem-solving abilities.

PROBLEM SOLVING ABOUT PROBLEM SOLVING

Search behavior as problem solving has a certain reflexivity captured in the expression ''problem solving about problem solving.'' The first ''problem-solving'' refers to library research; the second, to scholarly or scientific research. In library research, patrons engage in problem-solving activities; in scientific research, experimenters engage in problem-solving activities. The relation between patrons and experimenters may be seen when examining the problem-solving activities of each. The *Encyclopedia of Education* identifies the intellectual skills of a scientist as follows:[25]

1. observing;
2. using space/time relationships;
3. measuring;
4. classifying;
5. inferring;
6. interpreting data;
7. defining operationally.

The problem-solving activities of scientific research correspond to the problem-solving activities of library research. For example:

1. *Observing* the presence or absence of a spot on a slide preparation corresponds to observing that the Library of Congress subject headings do not include a particular subject term or that two different authors cite the same article.

2. *Using space/time relationships* in the formulation of an experimental hypothesis corresponds to using a mental map of the library's floor plan to locate particular call numbers, special collections, or areas in the collection.

3. *Measuring* the length of an object and recording it corresponds to copying exactly and matching the written call number to the call number of the book on the shelf.

4. *Classifying* the characteristics of an object or variable corresponds to arranging citations by subgroups on the basis of their subject.

5. *Inferring* the result of two or more simultaneously acting forces corresponds to inferring that an article would be in the microfilm collection because it is in an old newspaper.

6. *Interpreting* data from an experiment corresponds to deciding what references to look up after reading and evaluating an encyclopedia article.

7. *Operationally defining* a concept in

terms of how it will be measured corresponds to defining command languages in terms of their consequences.

There is, thus, a clear relationship between scientific research and library research. This is due in part to process, since both involve similar problem-solving tasks, and in part to content, since library collections are records of scientific products.

Some librarians conduct problem-solving workshops to bring out the problem-solving aspect of library research, in which they emphasize that "a detective's investigation for clues is analogous to a researcher's pursuit of information."[26] Students are encouraged to "transfer knowledge from other information-seeking experiences to library research." Exercises involve discussion of research questions, literature found through preliminary strategies, and reformulation in the light of experience. In such problem-solving sessions, social or interpersonal facilitation is expected to increase "students' confidence in their ability to make research decisions collaboratively." This type of brainstorming enriches problem solving by increasing available solutions. A similar effect can be expected when patrons consult librarians, since the social exchange enriches the information pool available to patrons. Thus, as patrons walk away from the reference desk with a new strategy and a renewed resolve, they surely feel more confident. Consulting a librarian becomes a rewarding experience.

An interesting metaphor that highlights the problem-solving aspects of library research is the notion that "librarians are gatekeepers of knowledge," in the sense that they "monitor the flow of information and tend the access tools to knowledge."[27] The problem-solving view of library research engenders the dramatic image of search behavior as an activity performed in the role of an information detective investigating the motives and instruments of the gatekeepers of knowledge.

CONCLUSION

Teaching problem-solving strategies to users renders explicit the implicit mental world of information seeking and critical thinking. Library use is an activity of one mind seeking contact with other minds. The study of the cognitive processes of library users allows librarians to develop a new focus on the inner microenvironment of information seekers. It has been suggested that "this dual involvement creates a heightened consciousness about information."[28] Librarians have the unique opportunity to integrate the roles of technician/problem solver in the information field and thinker/problem solver in a scientific field. Thus they "cross the threshold *into* the community of scholars rather than just stopping at the door *to* information"[29] (italics in original).

This perspective supports the idea that librarians would greatly profit from a second graduate degree in another discipline. The rationale for a double or interdisciplinary degree is not merely familiarity with issues and terminology in a scholarly field, but also the ability to contribute to the discipline in some unique way that stems from the librarian's dual involvement. An understanding of search behavior as problem solving may be a key consideration in this challenge because the reflexivity inherent in searching for information corresponds to the duality of librarianship seen in the wedded roles of technocrat and scholar.

REFERENCES

1. Jesse H. Shera, "An Epistemological Foundation for Library Science," *The Foundations of Access to Knowledge: A Symposium,* ed. Edward B. Montgomery (Syracuse: Syracuse Univ. Pr., 1968), p.7–35.
2. Noam Chomsky, *Language and Mind* (New York: HBJ, 1968).
3. Noam Chomsky, *Cartesian Linguistics* (New York, Harper, 1966).
4. Shera, "Epistemological Foundation," p.24.
5. Howard Maclay, "Introduction to Linguistics Section," *Semantics: An Interdisciplinary Reader in*

Linguistics, Philosophy, and Psychology, ed. Danny Steinberg and Leon A. Jakobovits (Cambridge: Cambridge Univ. Pr., 1971); Thomas S. Kuhn *The Structure of Scientific Revolutions,* 2d ed. (Chicago: Univ. of Chicago Pr., 1970).
6. Allen B. Veaner, "1985 to 1995: The Next Decade in Academic Librarianship," *College & Research Libraries* 46:295–308 (July 1985).
7. Charles Martell, "Creative Behavior in Libraries," *College & Research Libraries* 64:293–94 (July 1985).
8. Deborah Jakubs, "Reactions to '1985–1995: The Next Decade in Academic Librarianship,' Parts I and II," *College & Research Libraries* 46:309–19 (July 1985).
9. Gordon H. Bower and Ernest R. Hilgard, *Theories of Learning,* 5th ed. (Englewood Cliffs, N.J.: Prentice-Hall, 1981), p.299–325.
10. Endel Tulving and W. Donaldson, eds., *Organization of Memory* (New York: Academic Pr., 1972); George Mandler, "Association and Organization: Facts, Fancies, and Theories," *Verbal Behavior and General Behavior Theory,* ed. T. R. Dixon and D. L. Horton (Englewood Cliffs, N.J.: Prentice-Hall, 1968); George A. Miller, "The Magical Number Seven Plus or Minus Two: Some Limits on Our Capacity for Processing Information," *Psychological Review* 63:81–97 (1956).
11. Allen Newell and Herbert A. Simon, *Human Problem Solving* (Englewood Cliffs, N.J.: Prentice-Hall, 1972).
12. Constance Mellon, "Information Problem-Solving: A Developmental Approach to Library Instruction," in *Theories of Bibliographic Education: Designs for Teaching,* ed. Cerise Oberman and Katina Strauch (New York: Bowker, 1982), p.82.
13. Ibid., p.85.
14. M. Henle, *Documents of Gestalt Psychology* (Berkeley: Univ. of California Pr., 1961); Bower and Hilgard, *Theories of Learning,* p.299–325.
15. Leon A. Jakobovits and Diane Nahl-Jakobovits, "Learning the Library: Taxonomy of Skills and Errors," *College & Research Libraries* 48:203–14 (May 1987).
16. Susan Annora Deese, "Integrating Library Use Education with Study Skills Instruction," *Teaching Librarians to Teach: On-the-Job Training for Bibliographic Instruction Librarians,* ed. Alice S. Clark and Kay F. Jones (Metuchen, N.J.: Scarecrow, 1986), p.207.
17. David Fraser, "Memory Skills: Whose Concern?" *College & Research Libraries* 46:320–26 (July 1985).
18. Ibid., p.324.
19. Ibid., p.324.
20. Mary Reichel, "Preparing to Teach: Bruner's Theory of Instruction and Bibliographic Education," in Clark and Jones, *Teaching Librarians to Teach* (see ref. 16), p.20.
21. Deese, "Integrating Library Use Education," p.215.
22. Jakobovits and Nahl-Jakobovits, "Learning the Library."
23. Donald H. Meichenbaum and J. Goodman, "Training Impulsive Children to Talk to Themselves: A Means of Developing Self-Control," *Journal of Abnormal Psychology* 77:115–25; Arthur Wimbley and Jack Lochhead, *Problem Solving and Comprehension: A Short Course in Analytical Reasoning,* 2d ed. (Philadelphia: Franklin Institute Pr., 1980), p.24–27.
24. Peter Ingwersen and Soren Kaae, *User-Librarian Negotiations and Information Search Procedures in Public Libraries: Analysis of Verbal Protocols* (Denmark: Copenhagen Royal School of Librarianship 1980), p.91–92 (mimeographed document).
25. Lee C. Deighton, ed. *Encyclopedia of Education,* V.I (New York: Macmillan, 1971), p.197.
26. Mary M. Huston and Willie Parson, "A Model of Librarianship for Combining Learning and Teaching," *Research Strategies* 3:75–80 (Spring 1985), p.78.
27. Ibid., p.75, attributed to Eugene Garfield.
28. Ibid.
29. Ibid.