The effectiveness of a brief program designed to teach occupational therapy students enrolled in a graduate research methods class to conduct searches of four electronic databases was investigated. Students in the experimental class read an instructional booklet and received approximately 1 hour of supervised practice time using compact disk-read-only memory (CD-ROM) equipment. Questionnaire data revealed that compared with the students in the control class, the students completing the training program reported being significantly more familiar with six of seven key concepts and indicated significantly higher levels of usage of the four databases studied in the program.

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The decade of the 90s is already being referred to as the age of information. Although this designation may or may not still seem appropriate by the end of the decade, there can be little doubt that the effective retrieval and use of information will become increasingly important in the years ahead.

It is reasonable to assume that the exchange and use of new information will become an increasingly important aspect of the discipline of occupational therapy. One of the clearest examples of this relates to the flow of information between and among researchers and clinicians. Gilfoyle and Christiansen (1987), in the first of a series of articles discussing the role that research should play in the future development of occupational therapy, stated that research activities are important for maintenance of the status and credibility of disciplines.

The relationship between information flow and research was stressed by Ottenbacher (1986) when he stated that the purpose of clinical research is to expand the knowledge base that enhances practice. In a later article, Ottenbacher (1987) described in further detail the relationship between research and clinical practice.

The importance of information for both researchers and clinicians is evident. Recent technological changes in the information field, however, are increasingly demanding that occupational therapists master new techniques for locating and retrieving information related to their needs. Today's modern library may still retain the traditional card catalog and many volumes of printed indexes that historically have provided access to desired information. Increasingly, however, these tools are being replaced by electronic storage and retrieval systems.

These systems are frequently categorized as being either on-line systems or compact disk—read-only memory (CD-ROM) based systems. In the case of on-line systems, communication lines are used to link users with information stored in a computer located some distance away. Conversely, CD-ROM systems store information on compact disks, which are decoded in a CD player, which is usually located near the user.

A recent survey reported by Werking (1991) showed that 74% of a sample of college libraries were using CD-ROM technology. Interestingly, none of these libraries reported using this technology as early as 1986. In an earlier study, Poisson (1989) determined that 21% of a sample of biomedical libraries were using CD-ROMs, and an additional 28% were considering purchasing them.

The rise in the use of automated information retrieval systems has paralleled the rapid increase in the number and types of information databases available. Williams (1990) reported that the number of on-line databases increased from approximately 300 in 1975 to over 3,500 in 1989. Although CD-ROM technology emerged somewhat later, the number of CD-ROM databases increased from approximately 40 in 1985 to over 400 in 1989. In the past, electronic databases have most often been used to pro-
vide either statistical information or bibliographic citations to journal articles. Recent developments, however, have enabled this technology to provide users with the complete texts of journal articles, reference sources, and even encyclopedias.

While automated information systems offer a number of advantages over manual systems, one of the most important advantages derives from the way in which information is indexed and thus retrieved in automated systems. For example, using either on-line systems or CD-ROM based systems, one can usually employ several search terms simultaneously and also limit a search to particular years, languages, types of material, etc. (Piternick, 1990). The speed and precision provided by such capabilities represent a major advantage over manual searching.

Automated information systems, while offering powerful new search capabilities, also require a new set of skills on the part of the searcher. This need is increasingly being recognized by academic institutions. In a recent survey, Williams and Hu (1989) found that training in on-line information retrieval was a required part of the curriculum at 78% of law schools and 51% of medical schools. In addition, numerous elective training programs were being offered. Evidently, the development of information retrieval skills is rapidly becoming a major goal of many professional education programs.

With this in mind, we designed a brief training program to teach graduate students in occupational therapy to conduct information searches using CD-ROM equipment. The effectiveness of this program is the focus of the present study.

Methodology

The study involved 27 graduate students in occupational therapy who were enrolled in a research methods course during the fall semester of 1990 and a similar group of 30 students enrolled in the same course during the spring semester of 1991. Early in the fall semester, students in the class were given a questionnaire designed to assess their knowledge of and previous experience with automated information searching. On the basis of the results of this questionnaire, several instructional techniques were designed and tested in an effort to develop an effective instructional strategy for teaching students to conduct information searches using CD-ROM based equipment.

The resulting instructional unit was subsequently incorporated into the course during the following semester. This unit consisted of several major components. All students were initially required to read a booklet entitled *Medical Information Searching Simplified (MISS)* (Schumm, 1990). This booklet comprised five chapters, the first of which provided a general introduction to automated information retrieval. Each of the remaining four chapters featured a discussion of an individual bibliographic database.

The primary emphasis of the introductory chapter of the booklet was on distinguishing between free text searching, which is based on the use of search terms supplied by the searcher, and controlled searching, which employs search terms (descriptors) selected either from the thesaurus accompanying a particular database or from a designated list of subject headings, such as the Medical Subject Headings list. Examples were then provided to illustrate how the terms *and* and *or* can be used to combine several search terms into a single search with the use of the principles of Boolean logic as applied to sets of information. The chapter concluded with a discussion of techniques for limiting information searches to particular years, languages, or types of material.

The final four chapters of the booklet focused on the use of four bibliographic databases having relevance for occupational therapy. Chapter 2 described the use of the Medline database, which is essentially an electronic version of *Index Medicus,* with the addition of several other indexes to dental and nursing literature. The following chapter featured a discussion of the Nursing and Allied Health database, which represents the electronic equivalent of the *Cumulative Index to Nursing and Allied Health Literature.* Chapter 4 described the use of PsycLIT, a database corresponding to *Psychological Abstracts,* which indexes literature relevant to the field of psychology. The final chapter dealt with the ERIC database, which is an index to education literature produced by the Educational Resources Information Center of the U.S. Department of Education.

In addition to the MISS booklet, approximately 1 hr of class time was provided during which students were given the opportunity to practice automated searching using CD-ROM equipment housed in the main campus library. During these sessions, the students were provided with a flowchart designed by the course instructor (the first author) that gave simplified directions for using the CD-ROM equipment. The course instructor and several librarians were available to answer students' questions during these sessions.

The students' progress was evaluated by means of a quiz given on the assigned reading. Students were also required to turn in the results of a computerized search that they had conducted on their own time on a topic of their choice. Finally, a questionnaire similar to the one used at the beginning of the first semester was distributed during the final week of the course.

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1Available at the National Library of Medicine, Bethesda, MD 20894.
2Produced by CINAHL Corporation, Glendale, CA 91209.
3Produced by the American Psychological Association, Arlington, VA 22201.
Results

The anonymously completed questionnaire that was distributed at the end of the second semester contained one question designed to determine whether the students had actually read the assigned MISS booklet. Twenty-nine of the 30 students reported that they had done the required reading, which led us to conclude that an educational treatment had been implemented during the second-semester class.

To determine the equivalence of the two groups of students with respect to their use of personal computers, we included an item that asked for this information. The results revealed that 12 of the 27 students from the first semester operated personal computers, compared with 19 of the 30 second-semester students. Because this difference did not prove to be significant when a chi-square test was applied, we concluded that students from the two semesters represented similar populations, at least with respect to their use of personal computers.

We assessed the students' familiarity with a variety of terms and concepts used widely in the field of automated information retrieval and which were discussed in the MISS booklet by asking them to indicate which terms on a list were familiar to them. The results were analyzed with a series of chi-square tests (see Table 1).

Second-semester students were significantly more familiar with all terms except thesaurus, which proved to be very familiar to both groups of students. In retrospect, we realized that the first-semester students probably responded to the more general definition of the term thesaurus, as opposed to the more specialized meaning of the term as it is used in the field of automated information retrieval.

Clearly, students who had undergone the second semester training program were more familiar with relevant terminology. In addition, more of these students, as compared with the first-semester students, searched the databases covered in the course. For the Medline database, 5 first-semester students (N = 27) reported using it, versus 25 second-semester students (N = 30); for Nursing and Allied Health, 5 first-semester students versus 26 second-semester students; for PsychLIT, 8 first-semester students versus 19 second-semester students; and for ERIC, 6 first-semester students versus 20 second-semester students.

A series of chi-square tests revealed that the second-semester students reported significantly higher (p < .01) levels of use of all four databases, as compared with the first-semester students. The magnitude of these differences suggests that many second-semester students used several of the databases for their own purposes outside of scheduled class time. It thus appears that not only were the second-semester students significantly more familiar with relevant terminology, but their knowledge was also associated with the increased use of electronic databases, as compared with first-semester students.

Conclusion

Evidence from this study suggests that although substantial numbers of students entering graduate programs in occupational therapy already operate personal computers, this experience does not necessarily translate into the ability to conduct computerized information searches. This fact is important in light of the rapidly increasing use of electronic information sources.

Libraries and information centers are increasingly offering information only in electronic form. Although this trend may result in more and better information becoming available to researchers and clinicians, occupational therapists are likely to benefit only if they possess the skills needed to effectively retrieve this information.

Fortunately, the results from this study suggest that relatively brief and inexpensive training programs may be effective in helping occupational therapy students become familiar with the principles of automated information retrieval. Further research is required to determine which elements should be included in an optimum training program. It appears clear at this point, however, that such programs are both desirable and effective in helping students cope in this age of information.

Table 1

<table>
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<tr>
<th>Term</th>
<th>First-Semester Students (N = 27)</th>
<th>Second-Semester Students (N = 30)</th>
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Note: ns = not significant.

References


