AN ABSTRACT OF THE THESIS OF

Nattaya Keowmookdar for the degree of Doctor of Philosophy in Education presented on July 8, 1993.

Title: A Comparison of the Effectiveness of Two CD-ROM Database Training Methods

Abstract approved:

The primary question to be answered as a result of the research was: Do native English-speaking undergraduate students learn CD-ROM database search skills more effectively through the use of conventional instruction method or by training confined to a written manual self-instructional method? Thirty-seven Oregon State University students were randomly assigned to two groups and partici-pated in the study. The study utilized an experimental pretest-posttest control group design. The length of the study was six weeks. All participants were pre and post-measured using the CD-ROM Database Competency Test which was validated using the Delphi method. The subjects were trained using Wilsondisc and SilverPlatter databases. ANCOVA and t-tests were the main statistics utilized in the analysis. The results of the study were as
follows: 1) Subjects in both treatment groups experienced significant test score gains between pretest and posttest; 2) Those subjects which were assigned to the conventional instruction group had significantly higher scores than did subjects assigned to the self-instruction group; 3) Subject gender was determined not to be a factor when differences were considered from test results; 4) Interaction did not play a significant role in influencing the data results; 5) Students rated formal training as being very helpful in improving the effectiveness of their CD-ROM database searches.

The major conclusion drawn from the study was that the native English-speaking students at Oregon State University learned CD-ROM searching skills more effectively through the conventional instruction method than those students who were trained by self-instruction. The results of the study substantiated the need to undertake further efforts to improve the efficiency of learning CD-ROM access instructional methods in higher educational settings.
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A Comparison of the Effectiveness of Two CD-ROM Database Training Methods

CHAPTER 1

INTRODUCTION

The emerging of the modern technological tools challenge education today and tomorrow. The use of computer technology in modern life is widespread in both academia and the workplace. Global competition and revolution at work cause the changes in the educational system. As a result, the students must acquire fundamental skills on the use of computer technology (Oregon Department of Education, 1993). Computer keyboard familiarity, the use of a software package, and computer literacy are the essential requirements for computer accessibility and usage. Within both academic life and at the workplace, in order to support and maintain acceptable levels of productivity, it has become a necessity that everyone understand the capacities as well as the limitations of this technology (Smalley & Brady, 1984).

CD-ROM database search is a research tool. A lifetime skill of research strategy prepares students to meet with the present and future information age (Mendrinos, 1989). To search periodicals and literature through paper indexes
is a less than universally popular method when information retrieval processes can be completed more quickly and with greater ease of access using a personal computer. Optical disk, or CD-ROM (compact disc read-only memory) information storage databases provide digitally-based records that is read by a laser beam controlled through a CD-ROM driver. CD-ROM databases are used to maintain information records that are not subject to change. In addition to which the driver-controlled laser beam is limited in the ability to read and retrieve information from the CD-ROM database. These types of databases are increasingly used nationwide to provide a source of comprehensive bibliographic information.

In recent years, the number of users, including undergraduate students, performing CD-ROM database searches in college and university libraries has been growing rapidly (Barbuto & Cevallos, 1991, Kamala, 1991, Rholes & Caldwell-Wood, 1987). Recent statistics at Oregon State University (Corvallis, Oregon) indicate that 50.70% of all CD-ROM database usage in Kerr Library was by undergraduate students (Oregon State University, Kerr Library, 1990). It has been reported that students who perform their own bibliographical searches experience frequent access problems (Kenny & Schroeder, 1992). Allen (1990) found that most patrons of CD-ROM information services supported the need to provide training in CD-ROM information retrieval techniques, a position which has been supported either
fully or in part by numerous other recent studies (Bostian & Robbins, 1990; Culbertson, 1992; Johnson & Rosen, 1990; Schmidmaier, 1991; Stewart & Olsen, 1988; Stricker, 1990).

A number of the CD-ROM bibliographical instructional techniques provided with the service include information on basic search strategies and the use of Boolean logical operators. The potential effects of the development of complementary methods of instruction in the uses and applications of CD-ROM technology, are dependent upon end-user understanding of computer systems, in relation to gender as well as other related factors. This area of practical instruction has become a source of concern and a prominent and general focus of research interest (Bostian & Robbins, 1990; Charles & Clark, 1990; Culbertson, 1992; Johnson & Rosen, 1990; Kenny & Schroeder, 1992; Maxymuk, 1991; Whitaker, 1990). The impact of those factors that affect understanding of the basic requirements for the conduct of effective CD-ROM database searches constitutes a specific research area in need of further investigation.

Problem Statement

Do native English-speaking undergraduate students learn CD-ROM database search skills more effectively through the use of conventional instruction method or by training confined to a written manual self-instructional method?
Research Objectives

The purposes of the present study were as follows:

1) To determine pretest and posttest mean score differences on a CD-ROM database competency test between subjects placed in conventional instruction and self-instruction groups;

2) To determine adjusted mean score differences on a CD-ROM database competency test between subjects placed in conventional instruction and self-instruction groups;

3) To determine adjusted mean score differences on a CD-ROM database competency test between male and female subjects; and

4) To determine the presence or absence of interaction effects for levels of training methods and for gender among subjects on a CD-ROM database competency test.

Based upon these research purposes, the major focus of the present study was to enhance understanding of the learning techniques required to facilitate successful end-user CD-ROM database searches.

Theoretical Framework of the Study

The theoretical framework of the present study was based upon implications drawn from the following arguments and/or research findings:
1) Research studies have demonstrated that instruction in the techniques of CD-ROM database searches should be a high priority instructional requirement at the college and university level.

2) CD-ROM vendors state that their software is simple, self-explanatory, and easily understood, and that little to no further training should be required.

3) Among CD-ROM databases, virtually no standardization exists with respect to search protocols and terminology, data format, truncation symbols, or system interfaces.

4) Methods of instruction which provide skills and tools that can be carried over from system to system have been highly recommended.

5) Formal classroom presentation training methods in the uses of computers have been preferred by female end-users.

6) A review of the literature has demonstrated that there are no CD-ROM database competency tests that are appropriate for the specific purposes of the present study.

7) CD-ROM database searches constitute applications of a new technology, and thus a need to investigate the effectiveness of training methods in relation to various learning factors exists.
Individual CD-ROM database searches have gained in popularity at college and university research levels. Comparative studies have been conducted upon the uses of print indexes, on-line databases and CD-ROM databases, various user interfaces, and various CD-ROM conceptual models. Though it has been suggested that end-users could successfully search CD-ROM databases after receiving formal database instruction, no specific investigations have been focused upon the comparative effects of formal training methods in relation to end-user learning factors such as training methods used and transfer of skills. Therefore, it would be useful to test whether formal instruction, aimed at the development of effective search and basic skills that can be transferred from system to system, can be used to increase CD-ROM database competency test scores.

Significance of the Study

The present study was directed at the determination of the influence of two training methods, as well as collective differences in learning among male and female undergraduate students, upon the ability to provide instruction in the techniques required to conduct effective CD-ROM database searches at Oregon State University (OSU). The objective of the study was to increase awareness of effective training methods among undergraduate students as well as among instructors. Barbuto and Cevallos (1991) had con-
cluded previously that formal training programs based upon the most efficient methods of instruction would be required to attain this objective. End-users can developed competency in database searches by effective designed training methods (Stern, 1991). The results of the present study substantiated the need to undertake further efforts to improve the efficiency and quality of learning of CD-ROM access instructional methods in higher education settings.

Study Assumptions

1) It was assumed that the CD-ROM database competency test would provide a valid measure of student knowledge.

2) It was assumed that the subjects selected to take part in the study would participate to the full extent of their individual potential.

3) It was assumed that materials presented in teaching sessions would be taught in identical manner during each session.

Limitations of the Study

1) The study was limited to native English-speaking undergraduate students enrolled at Oregon State University, Corvallis, Oregon, during the academic year 1992-1993.
2) The study was limited to instruction in the Wilsondisc and SilverPlatter databases search program discs.

3) The study data were limited to those test items included on the CD-ROM database competency test.

4) The study was limited to those classrooms at Oregon State University equipped with accessible computer terminals.

5) The sample population considered for the study was limited to a group of volunteer student subjects.

Definition of Terms

The following terms are defined as they were used in the present study:

CD-ROM: Compact disk read-only memory consisting of a laser-mastered 120 mm (4.72") polycarbonate disk capable of storing approximately 750 megabytes of information. The information may consist of interspersed audio, visual, or alphanumerical (textual) files.

CD-ROM database: CD-ROM which stores bibliographical information that can be read by a laser beam controlled by the CD-ROM driver.

CD-ROM database competency test: A test designed to measure the amount of knowledge and/or skill an
individual has acquired as a result of formal database instruction.

Conventional instruction group: A randomly selected group of subjects taught to perform database searches.

Database: Information (data) contained in a machine-readable format that can be searched by a computer (Lathrop, 1989).

End-User: A person accessing information in a database; the term is frequently used to refer to an untrained or self-trained searcher, as differentiated from professional searchers, information specialists, or librarians (Lathrop, 1989).

Learning: "The process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38).

Native English-speaker: An individual whose mother tongue language is English.

Search strategy: Outline of a computer search, usually including terms to be used and statements to indicate the Boolean (logical) relationships among the terms.

Self-instruction group: A randomly selected group of subjects asked to use instructional manuals, user's guides, online help, or other help guides to perform database searches.
SilverPlatter: An individual database vendor program disc.

Wilsondisc: An individual database vendor program disc.

Summary

Effective training methods to instruct end-users in the efficient uses of CD-ROM databases should be investigated and determined. Research objectives were discussed and a four-part problem statement was presented. The significance of the study was analyzed, and the study assumptions and limitations were indicated. Finally, the terms specific to this investigation were defined.
CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

This chapter reviews the literature, related to the uses of CD-ROM, in six sections: CD-ROM databases, CD-ROM and online databases, database searches and training methods, suggestions for end-user training, gender differences, and Delphi method. The methodologies of conducting effective CD-ROM database searches constitutes a new field of study. In 1984, CD-ROM technology was introduced and by 1987 it had gained rapid acceptance in most academic libraries, including Kerr Library at Oregon State University (Corvallis, Oregon).

CD-ROM Databases

Many courses offered at the university instructional level require the performance of library exercises and research. Recently developed systems of information technology have included CD-ROM database systems, claimed by the vendors responsible for their development to be user-friendly and easily learned by self-instructional means (Kenny & Schroeder, 1992). CD-ROM discs are composed of
thin sheets of heat-sensitive plastic used to store digitally-coded information, and are extremely durable. CD-ROM discs thus provide an efficient media for the storage of retrievable information.

At the minimum, each CD-ROM disc is capable of storing the equivalent of 1,200 floppy disks, 250 large reference books, 2,400 full screen photographs (Phillipo, 1989) or 680 MB of storage capacity. CD-ROM databases contain three types of information, including full-text, bibliographic, and directory or numeric information (Berger, 1989), and require less time to search than print indexes (Ley, 1989). This CD-ROM database system can thus provide time savings, is generally less expensive to use than online databases, and allow performances of searches with multiple keywords, authors, or other qualifiers (Berger, 1989; Stewart & Olsen, 1988). In contrast, searches of print indexes are confined to single a concept or author searches, similar in nature to the "browse" mode, one of the three modes offered by the Wilsondisc databases (Kern, 1990). The Wilson company, a large producer of CD-ROMs, has summarized the advantages of CD-ROM searches as follows (Miller & Loeding, 1989, pp. 24-25):

1) Convenience of printing out citations on a printer, if available. Printing references eliminates the problem of incomplete or incorrect citations manually copied from sources. The ability to print out citations directly from the disc is significant.

2) Cumulative data. Because of the tremendous storage capacity of the laser disc, it is possi-
ble to scan several years of data from the same or related databases, simultaneously.

3) Flexibility of access. Laser discs provide numerous access points and the ability to combine terms, unlike the linear mode of searching print materials.

4) Sorting of citations. The most recent citations are displayed first in most systems.

5) More data provided for many CD-ROM products. Early CD-ROM case studies indicate that users want more data to be included on discs. WILSONDISC supplies the unabbreviated source name and lists all subject headings assigned to each citation, providing other suggested topics for research...

6) Currency of information. Some discs provide more recent citations than printed sources. Discs are generally issued monthly, quarterly, semi-annually, or annually.

7) Less storage space required. The shelf space required to store CD-ROM data is greatly diminished.

8) Disabled accessibility. Users with physical disabilities find information retrieval more user-friendly than with a microcomputer.

However, CD-ROM electronic databases have not been standardized, and databases produced by different vendors utilize different search software and operating command systems (Blumenthal, Howard, & Kinyon 1993; Nickerson, 1991). This lack of uniformity is one reason why instructional technology has failed to keep pace with other advantages of these systems (Gayeski, 1989).

Nonetheless, the conduct of research has been facilitated by the utilization of CD-ROM database searches of the literature of a given field (Berger, 1989). Increasing numbers of instructors assign students to CD-ROM database
searches. Electronic database searchers use abstract conceptualization (Bodi, 1990), critical thinking (Blumenthal et al., 1993; Nash & Wilson, 1991), and problem solving (Huston, 1989) during the conduct of searches. Each of these approaches is influenced by individual characteristics (Kamala, 1991; Sein, 1988). To acquire search strategies, students engage in abstract conceptualization by thinking through their topics and choosing the most appropriate resources and keywords (Bodi, 1990). Using computer technology effectively requires the application of critical thinking to process selectively the overwhelming amount of information that exists in each database. As software changes, and as it will hopefully continue to be improved, it is necessary to choose appropriate information.

Nash and Wilson (1991) determined that critical analyses of the results of database searches was a major problem for undergraduate students, demonstrating that students need to be taught to apply critical thinking skills to their information sources. CD-ROM indexes are not only a graphical illustration of this point, they also provide an excellent opportunity for teaching these skills.

Huston (1989), from more than 10 years of observation of users' computer-based search techniques by librarian researchers, reported consistent findings that most users lacked the contextual understanding necessary to effectively conduct online problem-solving. Further
research results have shown that college students at the University of Wisconsin (Eau Claire) could be successfully introduced to critical thinking processes for learning methods of bibliographic instruction (Engeldinger, 1988). Sein (1988), in a study of individual differences related to learning computer systems among novice users, found that high-visual subjects performed better than did low-visual subjects.

Previous experience with microcomputers may not be a necessary prerequisite for individual success with CD-ROM searches. A study by Stewart and Olsen (1988) provided the qualified evidence that end-users with at least some microcomputer background could use CD-ROM databases to advantage so long as the search software was comparable in user-friendliness to that produced by SilverPlatter. However, Siitonen (1985) had previously demonstrated that computer experience could not be correlated with search results. Thus, to meet their informational needs, students will be required to make critical choices when using CD-ROM databases and other electronic indices. Learning this technique will not only lead students to relevant information, it will also raise their consciousness about the need to select and evaluate during the process of critically acquiring useful information on any given topic. (Nash & Wilson, 1991).
Online information retrieval has been available since the late 1960s (Johnson & Rosen, 1990; Miller & Loeding, 1989). Online database search techniques are not easily learned, and are frequently performed by such intermediaries as trained librarians. Staffing considerations alone provide justification of the need to train end-users to directly perform online searches with minimum assistance, training which must be specialized in view of the complexity of most of the software used for online searches (Paulk, 1986). At Drexel University, Wozny (1988) observed that freshman college students trained to complete online database searches had difficulty designing appropriate search strategies. Armstrong (1991) noted that though the basic commands were easily learned, training in database content and search structures would be required to obtain successful search results. For online database searches, end-users face time pressures since they must pay for connection to the system. Thus, by 1984, CD-ROM technology had been introduced to specifically facilitate economical end-user database searches.

One result of this transformation has been that online database traffic has decreased by more than two-thirds since the introduction of CD-ROM technology, and the most heavily searched databases have become available on CD-ROM (Barbuto & Cevallos, 1991). CD-ROM database search systems
were initiated at Oregon State University (OSU) starting in 1987, and the number of searches has since grown by at least 20% per year (Donel and Holbo, 1993). At OSU, Wilsondisc and SilverPlatter are the two principal CD-ROM resource, covering various subjects used by faculty, staff and students. Other CD-ROM databases in frequent use include Agricola, Applied Science and Technology Index, the Biological and Agricultural Index, the Business Periodical Index, ERIC, General Science Index, Medline, and the Social Science Index (OSU, Kerr Library, 1992).

Database Searches and Training Methods

The growth in the use of CD-ROM database search techniques is apparent, and the importance of effective training methods for the use of these techniques has been recognized (Huston, 1989; Jewell, 1989). For efficient use of these systems, database searchers must be familiar with the structure of CD-ROM systems since each database is different. (Ankeny, 1989; Armstrong, 1991; Blumenthal et al., 1993; Charles & Clark, 1990; Johnson & Rosen, 1990; Rholes & Caldwell-Wood, 1987). Culberton (1992) concluded that instruction in CD-ROM database search techniques should be given a high priority to enable end-users utilization of the full potential of CD-ROM technology.

Various training methods, including comparison of the differences among user interfaces (e.g., menu-driven or
command-driven) have been reported, as well as consider-
ations of the use of computer-assisted instruction (CAI),
traditional classroom set-ups (David, 1989; Puttapithak-
porn, 1990; Reddy, 1988, and provided instruction at the
point of use (Potter, 1992). Research reports have also
been issued which cover training methods according to con-
ceptual models (e.g., abstract or analogical models), as
well as training specific to the use of print indexes,
online, and CD-ROM database indexes and resources (Bostrom,
Olfman, & Sein, 1988; Kern, 1990; Montgomery, 1987; Sein,

In a report by Reddy (1988), "Search strategy skills: A two-
method comparison of teaching CD-ROM bibliographic
searching techniques," the effects of CAI and traditional
lecture training methods in CD-ROM online bibliographic
search skills between two groups of ninth grade students
was considered, utilizing The Reader's Guide to Periodical
Literature. Reddy's methodology was based upon search
strategies design in which the topics were narrowed and de-
fined, following which the subjects were asked to identify
key concepts, find synonyms and terms related to each con-
cept, and then to group like concepts, form sets, apply
logical connectors (Boolean), and to conduct the search.

The CAI group learned the Online Retrieval I, II and
the Reader's Guide Level II using the Combase software
package. The lecture group was instructed using
transparencies and a transcript identical to the computer
screens and scripts viewed by the CAI group. Reddy (1988) found that the students were able to master the online technology and terminology regardless of the instructional method; however, all students required further instruction in Boolean logic and cross-references.

Stewart and Olsen (1988) compared training methods among four groups, including instruction versus non-instruction, for learning to use a CD-ROM database and a print index. The training contents included vocabulary control, logical operators (Boolean) and thesaurus descriptors. The CD-ROM instructed group received a 50-minute instructional session, while the print indexes instructed group was given a 30-minute instructional session. Both non-instructional groups were given an instruction sheet explaining the assignment and they were advised to consult the search manuals. Results indicated that the two instructed groups scored higher than the two non-instructed groups. Moreover, the CD-ROM instructed group had greater success finding relevant articles than the CD-ROM non-instructed group, and the print index instruction group did slightly better than the print index non-instruction group. It was speculated that the Hawthorne effect may have contributed to improvement of the instructed groups.

In contrast to other studies, Kern (1990), compared the browse mode between a CD-ROM database and a print index, and concluded that the Readers' Guide database was easy to use and required little training for high school
sophomore students. Kern employed two training methods using a print index and CD-ROM database version of Readers' Guide to train high school students. The software was set up to be used only in the "Browse" mode, corresponding to traditional subject searches in print indexes. It was found that the database search group retrieved more articles than did the print index group. It was noted that the evaluation was based on the number of relevant articles found and was further limited only to the browse mode. It was concluded that with a minimum of training and access to a monitor capable of providing help, high school students could confidently utilize a user-friendly database. However, Barlow, Karnes, and Marchionini (1987) found that though students with minimal training were successful in browse mode searching, they continued to experience difficulty with a free-text search mode and the use of Boolean logical operators.

A number of studies have reported a common set of problems end-users encounter with CD-ROM databases. These problems were associated with the database contents, search structure, the use of logical operators, vocabulary control, development of search strategies, the use of thesauri, truncation, the limiting of fields to search, and failure to differentiate between keywords and subject descriptors (Allen, 1990; Barbuto & Cevallos, 1991; Blumenthal et al., 1993; Culberton, 1992; Sichel, 1991; Silvia & Kilman, 1991). According to Johnson and Rosen
(1990), CD-ROM end-users need to be advised about database content and structure, as well as appropriate search strategies for specific databases. It has also been demonstrated that full knowledge of the contents of a database contributes to the success and credibility of a searcher (Weston & Lauderdale, 1988). Huston (1989) noted that in library experiments with various instructional approaches over a 10-year period, end-users required training in basic searching concepts.

Blumenthal et al. (1993) discussed the impact of CD-ROM technology on a bibliographic instruction program and concluded that to use a database fully, users needed to understand Boolean logic, the appropriate use of connectors, the importance of thesauri for accessing information, the value of truncation symbols, and the ability to break down topics into the most concise statements possible to identify the main search concepts. Charles and Clark (1990) observed 26 graduate, 16 undergraduate, and 3 university or community staff users at the Texas A & M Evans Library who used the SilverPlatter Agricola database with both CD-ROM and an online system. They determined that the majority of the participants did not understand basic search concepts, including selection of search terms, use of Boolean operators, truncation, and the limitation of fields. They commented that the end-users were impressed by the speed of the system and the large number of cita-
tions, but that little attention was given to the quality of the search results.

Salomon (1988) surveyed reference librarians to determine the impact of CD-ROM on their departments. Respondents indicated that, although users had some difficulty with search strategies and Boolean logic, CD-ROM systems were eagerly accepted by library patrons. Culbertson (1992) found that less than 20% of the participants of his study used special feature commands or segment searches and that only slightly more that half used Boolean connectors, the basic building blocks of database searches. CD-ROM end-users were usually able to obtain results and print records, but few used more sophisticated techniques to refine their searches. Culbertson stated that most of the searchers observed seemed to be unwilling or unable to progress beyond basic search levels. It was tentatively concluded that instruction should be a high priority for any library unit offering CD-ROM database searches, and that it cannot be assumed that patrons successfully use bibliographic CD-ROM databases after only a few minutes of introductory instruction. Culbertson recommended that further research was required to find effective instruction techniques that would enable end-users to utilize the full potential of CD-ROM searches.

Observations by Barbuto and Cevallos (1991), revealed that students did not understand the difference between keyword and descriptor concepts, and tended toward to use
the former more than the latter. Training sessions indicated that users were often totally unfamiliar with the purpose and content of print versions of indexes or abstracts searched through CD-ROM. These findings implied that heavy emphasis in training sessions on the use of the thesaurus may have been out of proportion to its importance to the end-users.

Maxymuk (1991) stated that CD-ROM database software is underutilized, that end-users needed instruction on the formation of search strategies, the limitation of searches, and in knowledge basic to database searches. Because CD-ROM databases are so simple to operate and the software is not fully utilized, professional observers often become frustrated when users do not employ the full capability of the software. Thus, at Temple University, researchers developed training programs oriented to the point of view of users, based upon two levels of instruction offered to either inexperienced or experienced users.

Silvia and Killman (1991) stated that the CD-ROM databases were popular at the St. Mary’s Academic Library, but that end-users had difficulty structuring search strategies, understanding Boolean logical concepts, and employing the appropriate keywords or terminology. They stated that end-users were received a vast amount of how to retrieve information instead of given a conceptual strategy. One-on-one instruction, CD-ROM workshop instruction, and the use of print indexes as an instructional aid were the
methods of CD-ROM end-user training proposed as solutions to these problems.

Reese (1988) compared manual indices for the Reader's Guide and a CD-ROM InfoTrac II database to determine which provided the most favorable information access. Results reflected a 83% success rate for manual index searches and a 63% success rate for InfoTrac II searches. It was concluded that information experiments should be conducted to determine how individuals used CD-ROM retrieval systems, who made the best use of them, and how these systems could be improved. Kenny and Schroeder (1992) noted that CD-ROM vendors promoted their CD-ROM database software as user-friendly, self-instructional systems that required little on-site assistance for use, conducting frequent surveys on the state of user satisfaction. However, whereas Nash and Wilson (1991) found that students indicated satisfaction with their searches, more than one-third of those considered in their study retrieved relatively useless or inappropriate citations.

Rholes and Caldwell-Wood (1987) studied the effectiveness of two types of training using the ERIC SilverPlatter system: one-hour training sessions and self-instruction sessions based upon the use of four pages of instruction. The results showed that the survey respondents (85%) successfully completed their searches. However, 56% of the respondents reported experiencing problems, 30% had difficulty in the appropriate use of subject terms, and 22%
found difficulty in the operating steps (or what to do next). Other studies have indicated that the most popular training methods consisted of a short session or a day-long session (Armstrong, 1991; Gaul, 1986). Large amounts of information presented in only short periods of time is believed to create new problems for novice end-users. Several studies have shown that end-users search more effectively when given some degree of formal instruction (Culbertson, 1992; Haines, 1982; Stewart & Olsen, 1988). Lessons confined to an introduction to database search techniques has been found to be insufficient for both inexperienced and experienced end-users (Kenny & Schroeder, 1992).

Montgomery (1987) studied the training of end-user searchers, based upon the use and perceived benefits of online and non-online information resources. The purpose of the study was to investigate methods of training scientists and technologists to conduct their own online bibliographic searches. Nine months following either a one-day or a two-hour seminar, nonsearchers gave such reasons as forgetting what they had learned, too much time required to relearn search techniques, and a lack of practice opportunity for their failures to conduct their own searches.

Gayeski (1989) discussed the lack of uniformity among systems as well as the competing and mutually incompatible standards used by CD-ROM vendors. As systems were developed, it was common for a number of incompatible for-
mats to emerge, each produced by manufacturers who advertised their products as being user-friendly. Lack of standardization for CD-ROM systems means that a single manual cannot be used by an institution for all databases (Jaros, 1990). Jewell (1989) reported that at the University of Washington, the librarian experienced difficulty in providing effective end-users training due to differences in interface designs and various system. Charles and Clark (1990) concluded that CD-ROM systems were not as easy to use as they were proclaimed to be. End-users experienced difficulty switching between two separate systems because they lack the theoretical framework necessary to effect necessary transitions. Silvia and Killman (1991) stated that transferability of concepts is essential when libraries own many different types of CD-ROM products.

The increased use of CD-ROM reference services has meant that library staff have found it necessary to develop a variety of teaching methods to train end-users to initiate the different types of CD-ROM searches. The components of poor searches that were noted several years ago with the introduction of end-user searches using online systems, were still present with the availability of disc-based search techniques (Jaros, 1990). Litchfield (1990) has observed that there is reason for vendors to promote the user-friendly nature of their databases, since the alternative is to provide basic level training to customers at relatively high costs. The vendors provided training
only to trainers, and then left the responsibility to the library staffs as well as to end-users. In addition, Jewell (1989) stated that many end-users had difficulty in using vendor support materials and brief manuals. Users of the Newsbank Electronic Index have complained of the inadequacies of both user's manuals and help screens, factors which can only lead to unsuccessful searches (Compton, 1991). These findings stand in contradistinction to those of Keefe (1990), who has observed that the organization of learning environments, the instructional methods in use, and interactions between teachers and students all influence the course of human learning.

Suggestions for End-User Training

Instruction that facilitates end-user self-service searching is an emerging trend, based upon the provision of effective instruction by information professionals (Charles & Clark, 1990). Whether end-users are able to structure successful searches, or whether they are satisfied with the search results, are questions frequently in many researches since it has been determined that end-users need instruction in the formulation of search strategies and techniques (Clever & Dillard, 1991).

Some of the training techniques suggested by previously completed studies include: Instruction in the selection of a database, assistance in the determination of search
structures, and instruction in the use of Boolean logical operators, the use of keywords, truncation, and the limitation of fields (Barbuto & Cevellos, 1991; Eisenberg, Trombly, & Ruth, 1990; Jaros, 1990; Reddy, 1988; Silvia & Killman, 1991; Weston & Lauderdale, 1988); training conducted in classroom setting environments (Jaros, 1990; Gaul, 1986); hands-on training methods (Barbuto & Cevellos, 1991; Stern, 1991); and long-duration training (Gaul, 1986). Reddy (1988) recommended that the provision of hands-on experience with concept instruction would produce higher percentage success rates for the utilization of CD-ROM databases.

In the future, students should be taught how to retrieve information from multiple databases and how to transfer learned searching skills from one system to another (Blumenthal et al., 1991; Stewart & Olsen, 1988; Whitaker, 1990).

Gender Differences

That learning differences exist between genders has been established by a number of related studies (Allen, 1990; Belanger & Hoffman, 1990; Eastman, 1991). Kamala (1991) noted that such novice end-user characteristics as gender differences are taken into account in relation to CD-ROM database searches. According to Eastman, educational research has shown gender differences in atti-
tudes and time spent with computers; females were not expected to like computers and spent less time with them than did their male counterparts.

According to Nye (1991), the existence of gender-related learning differences with respect to computers deserves increased recognition. Kinvig (1987) stated that gender differences in learning styles included such factors as female preference for concrete experience and male preferences for abstract conceptualization. In addition, Kinvig found that teacher-centered and individualistic were the male primary learning characteristics, whereas personal and interactive were the most favored female learning characteristics among undergraduate students. Allen (1990) subsequently found that females indicated a greater preference for formal training in CD-ROM search procedures than did males.

Nye (1991) reviewed the literature on gender differences in learning, and curriculum and classroom designs in relation to computer software. He stated that many educators did not recognize the differences between males and females in learning styles that affect how students respond to computers. For example, Gilligan (Nye, 1991) had stated that males perceive relationships from a hierarchic perspective, whereas females perceived the webbed nature of relationships. Understanding the relationship between learning styles and gender, as well as the reasons underlying the perceived differences between genders, perhaps
helps to explain student behaviors when computers are approached for the first time. It would be preferable for educators to seek the means to redress or balance the perceived inequalities, rather than to perpetuate them.

Belanger and Hoffman (1990) found there was a correlation between female levels of familiarity with computers and the frequency of use of the ERIC CD-ROM database by females.

In a study conducted by Reddy (1988), 68% of the female subjects were reluctant to use computers and required assistance to conduct database searches. It was stated that the reason for failing to find significant differences between the two training methods compared could have been related to the fact that more female than male subjects participated in the study. It was thus suggested that further research would be required to determine if male or female subjects were capable of mastering higher levels of search strategy skills when learning to search CD-ROM databases.

From the literature, it is obvious that few studies have focused on gender differences in relation to the use of computer systems, especially computer-based CD-ROM databases. This situation exists despite evidence of a more general nature which indicates that males and females do not learn best using the same methods. However, a number of factors have changed since these types of studies were first initiated, and more women are presently involved in the uses of computer technology. Therefore, the present
study is based upon the assumption that the ways in which females are trained to become familiar with new CD-ROM technologies is subject to improvement.

Delphi Method

Insofar as the literature demonstrates that there is no single CD-ROM database competency test which may be considered appropriate for the specific purposes of the present study, the Delphi technique was utilized to measure content-related evidence of the validity of the instrument developed for the study (Chapter 3). The Delphi technique can be described as a method for structuring group communication processes that effectively allows groups of individuals to deal with complex problems (Linstone & Turoff, 1975). It was originated at the Rand Corporation in the late 1940s as a systematic approach to the elicitation of expert opinions on various topics (Sackman, 1974), and was popularized for use in business, industry, and education by Helmer (1966) and others by the 1960s. Part of the appeal of the Delphi method resides in the presumed superiority of group rather than individual opinions (Martino, 1972).

Though the Delphi method was originally intended to be used as a forecasting tool, its more promising educational applications have been developed in the following areas:
1) as a method for studying the process of thinking about the future, 2) as a pedagogical tool which forces people to
think about the future in a more complex manners than they would as individuals, and 3) as a planning tool used to aid in probing priorities held by members and constituencies of an organization (Weaver, 1971). The many advantages of this method, including its simplicity and directness, ease of administration, minimal application time requirements, and low cost, make it particularly well-suited to educational research.

Usually one or more of the following properties of the application leads to the need to employ a Delphi method (Samahito, 1984):

1) The problem does not lend itself to precise analytical techniques, but can benefit from subjective judgments on a collective basis.

2) The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication, and may represent diverse backgrounds with respect to experience or expertise.

3) The opinions of greater numbers of individuals who can effectively interact in face-to-face exchanges are needed.

4) Time costs make frequent group meetings infeasible.

5) The efficiency of face-to-face meetings can be increased by a supplemental group communication process.
6. Disagreements among individuals are so severe or politically unpalatable that the communication process must be referred and/or anonymity assured.

7. The heterogeneity of the participants must be preserved to assure the validity of the results (e.g., avoidance of domination by quantity or by strength of personality).

A conventional "Delphi exercise" was employed for the present study. A paper-and-pencil questionnaire consisting of a series of items was developed, based upon the matching of items and objectives. This questionnaire was submitted to a Delphi panel established for the purpose of validation of the questionnaire as the study instrument. The three critical conditions required for application of a successful Delphi method were present (Delbecq, Van DeVen, & Gustafson, 1975):

1) Adequate time. Delphi should not be used when time is limited. Most Delphi studies take more than a month to implement. As a standard, the minimal required time for a Delphi process is about 45 days.

2. Participants skilled in written communications. Delphi should not be used with groups that have difficulty reading or in expressing themselves in written communications.
3. High participant motivation. Like all other group processes, the quality of responses is influenced by the interest and commitment of the participants. Delphi requires especially high participant motivation, since other individuals are not present to stimulate and maintain motivation.

Summary

It has been determined that the development of effective techniques to search CD-ROM databases has mandated the improvement of end-user training procedures, particularly as concerns instruction in the development of basic search strategies. This problem has become extended and increasingly serious as the number of vendors of CD-ROM databases has increased, while at the same time no single CD-ROM database system has gained acceptance as an industrial standard. Thus, institutions are unable to develop single manuals which could be usefully applied to multiple databases in use as educational tools. The existence of these conditions in research institutions mandates the development of improved educational tools and training methods. Previously completed research studies provide a body of knowledge upon which teachers and educators may draw for information on CD-ROM database end-user searching techniques and practices. Therefore, providing students with
the best education and effective instruction are responsibilities incumbent upon teachers, educators, and reference librarians.

Several questions remain to be answered in future research: Will end-users be able to effect transitions from one CD-ROM based system to another? How do males and females react to proposed learning situations? What will be the structure and nature of effective training methods?
CHAPTER 3

METHODOLOGY AND DATA COLLECTION

Introduction

This study was an experimental investigation of appropriate methods for instructing students in the use of CD-ROM database search techniques. Research questions focused on training methods and the gender of college students at Oregon State University (Corvallis, Oregon) with respect to the use of the WilsonDisc and SilverPlatter CD-ROM databases.

Selection of Subjects

Native English-speaking undergraduate students enrolled in various classes at Oregon State University (OSU) were asked to participate in this study. To establish a subject pool, the researcher contacted the instructors of high enrollment classes such as the introduction to business computer systems, computers applications and implications, geography, engineering, pharmacy, public health, and writing. In addition, notices concerning the research project were posted in Kerr Library, the chairs of various departments of the College of Liberal Arts, the College of
Health and Human Performance, and the College of Agricultural Science were contacted, and the advertising was placed in the OSU campus newspaper.

To directly recruit subjects for the study, 10-minutes of class time were spent in each participating classroom to promote the study. Native English-speaking students with no background in CD-ROM database formal instruction were encouraged to agree to participate in the study. At the end of each classroom presentation, the researcher met with the instructor to obtain a list of the students who wished to participate. A total of 87 students, each of whom was subsequently contacted for purposes of scheduling, agreed to participate in the study. Scheduling conflicts caused several participants to drop out of the study before the pretest. Of the 51 students volunteers who remained on the list, four were determined not to be qualified for participation on the basis of experience of previous database search training. The resultant sample of 47 subjects was then randomly divided into two sections, consisting of 23 subjects who received conventional instruction and 24 subjects who received only self-instruction in the use of CD-ROM databases.

Following the administration of pretest procedures, four students failed to appear for the first-week assignments, five did not appear for the second-week assignments, and one subject telephoned to withdraw from the study. Of the total of 37 volunteer subjects who completed the study,
22 of the subjects were assigned to the conventional instruction group and 15 subjects were assigned to the self-instruction group.

Instruments and Supportive Resources

Instruments and supportive resources used in the conduct of the present study are as follows:

1) CD-ROM Database Competency Test (Appendix A): A competency test developed by the researcher to measure the effectiveness of subject knowledge with respect to training methods. The test consisted of 16 multiple choice questions, for which subjects were asked to select the single best answers. The CD-ROM database competency test was constructed based upon experience derived by the researcher during five years as a CD-ROM consultant at Kerr Library, OSU. Following initial test design, the instrument was analyzed and critiqued by a recognized CD-ROM expert. However, analysis by a single expert in the field was not considered to be sufficient evidence of the validity of the test content. Therefore, content-related evidence of validity was estab-
lished through the application of the Delphi method.

2) A demographic questionnaire (Appendix B) was utilized to gather supportive information from the subjects.

3) CD-ROM database search instruction (Appendix C) provided the instructional plan which was given to the subjects.

4) CD-ROM databases Wilsondisc and SilverPlatter were selected for the study based on the frequent usage by the students at Oregon State University (each briefly described in Appendix D).

5) Subject evaluations, the purpose of which was to allow the subjects to express individual opinions about the validity and usefulness of the training process (Appendix E).

Training instructions were designed to teach the basic concepts of searching skills and database content, as suggested by Johnson and Rosen (1990) and Huston (1989). Weston and Lauderdale (1988) have stated that database content instruction for specific search areas will provide a contribution to the success of end-users. In addition, teaching transfer skills involves instruction in general skills that can be applied to any system, encompassing an introduction to the basic concepts of database structure, Boolean logic, field searches, truncation, the use of function keys, and uses of the help screens and help guides.
Teaching database concepts involved description of information contained within a database, enabling end-users to understand what could be retrieved and how retrieval could be accomplished. Awareness of how citations or records were arranged helped end-users understand how to retrieve records. A strategy worksheet was given to each end-user subject to assist in the organization of topics of concern.

Instrumental Validation

Five librarians, each an expert in CD-ROM electronic information retrieval systems, were requested to participate on the Delphi panel. Three of the selected experts were from Oregon State University, one was from the University of Oregon, and the final participant was from Western Oregon State College.

At the beginning of the test construction procedure, test items were developed under the supervision of a CD-ROM specialist. The Delphi members were then asked to provide comments upon the validity of the question developed. Each Delphi panelist received a package of materials which included summaries of the objectives and lesson plans for instruction and a copy of the proposed CD-ROM database competency test. For the first round, the panelists were asked to check whether each of 16 test items was representative of the study objectives. The panelists indicated
whether they believed each test item should be retained, rejected, or revised. If panelists chose to revise an item, they were asked to provide specific revision instructions. Following the first Delphi round, a revised edition of the CD-ROM database competency test was circulated among the panel members for appropriate comment and analysis. The results of the first round responses included the retention and revision of several of the 16 question items. Panel members reached consensus after the second round. The 16 question CD-ROM database competency test was shown in appendix A.

Research Hypotheses

The present study investigated responses to the following research questions:

1) There are significant posttest mean scores higher than the pretest mean scores on a CD-ROM database competency test.

2) There are significant adjusted mean score differences on a CD-ROM competency test between subjects placed in a conventional instruction group and subjects taught by self-instructional methods.

3) There are significant adjusted mean score differences on a CD-ROM database competency test between male subjects and female subjects.
3) There are significant adjusted mean score differences on a CD-ROM database competency test between male subjects and female subjects.

4) There are significant interaction for adjusted mean scores on a CD-ROM competency test between levels of training methods and gender.

Based upon utilization of the .05 level of significance, the null hypotheses used to test hypotheses 1 through 4 were expressed as follows:

\[ H_{01}: \mu_{\text{Pretest}} = \mu_{\text{Post-test}} \]
\[ H_{02}: \mu_{\text{Instruct}} = \mu_{\text{Self-Instruct}} \]
\[ H_{03}: \mu_{\text{Male}} = \mu_{\text{Female}} \text{ and} \]
\[ H_{04}: \mu_{\text{Instruct} \times \text{Male} \times \text{Female}} = \mu_{\text{Self-Inst} \times \text{Male} \times \text{Female}} \]

Research Design and Data Analysis

The design applied to the data in this study consisted of an experimental pretest-posttest control group testing process. An analysis of covariance (ANCOVA) procedure was utilized to evaluate responses to the null hypotheses \( H_{02}, H_{03}, \) and \( H_{04} \). Hypothesis \( H_{01} \) was analyzed using the t-test statistical procedure.

The results of the data analysis were used to determine the impact of those factors which affected changes in the mean scores for subjects' comprehension of the techniques of CD-ROM database searches in relation to gender. These results were compared to parallel results for the two
The experimental units were considered to be homogeneous, the numbers of units were small, and the treatments were assigned at random to units within blocks wherein each treatment was administered once to each block. This design constituted a logical approach (Petersen, 1985). The design consisted of two levels of training (conventional instruction and self-instruction) and two genders (female and male). The ANCOVA statistical tool was used since it provides for adjusted posttest determination of mean scores, reducing the effect of differences that existed between or among subject groups. The assumptions necessary for the use of the ANCOVA are as follows (Courtney, 1986):

1) Within each distribution, the values of both the dependent variable and the independent variables are normally distributed.

2) In the assignment of individuals to groups, sampling should be random.

3) The regression line depicting the data is linear and the regression slope for the dependent variable on the independent variable is equal for all treatment groups.

4) There is a rational need to adjust post-measure means using covariance as the statistic tool.

From Cohen (1988), for a power of .80 and an effect size of .40 at an alpha level of .05, it was suggested that a minimum of 17 subjects would be required for each training method (conventional instruction/self-instruction) x
gender (female/male) cell. The experimental design displaying the sampling arrangement is illustrated in Table 1:

<table>
<thead>
<tr>
<th>Method</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>Male</td>
</tr>
<tr>
<td>Self-Instruction</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

The dependent variable was the adjusted CD-ROM database competency posttest score, where N=13 was the cell size, 1 - β = .80, and α = .40 (Cohen, 1988). The mathematics model, based upon a two-way fixed design for ANCOVA, was:

\[ Y_{ij} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + \alpha(X_{ij} - \bar{X}) + \epsilon_{ij}, \]

where \( \mu \) was an unknown constant,
\( \alpha_i \) was the differential effect associated with the instructional method,
\( \beta_i \) was the differential effect associated with gender,
\( \alpha\beta_{ij} \) was associated with the interaction effect,
\( \alpha(X_{ij} - \bar{X}) \) was the adjustment of the posttest measure and,

$\epsilon_{ij}$ was the residual effect, assumed to be independently and normally distributed with a mean of zero and a variance of $\sigma^2$.

The t-test was utilized to analyze differences between pretest and posttest scores for the CD-ROM Database Competency Test. In summary, the study was conducted administering a CD-ROM database competency pretest and posttest, a two-way fixed design ANCOVA, and a true experimental design. As suggested by Campbell and Stanley (1966), randomized subject selection was used to maintain group equi- lency. The pretest-posttest control group design is based upon

$$R O_1 X O_2$$

$$R O_1 X O^2$$

where R indicates the random assignment of the subjects into two groups, experimental and control, X indicates the treatment, conventional instruction and self-instruction, and $O_1$ indicates the pretest and $O_2$ is the posttest analysis. The variables for the study were as follows:

1) Independent Variables:
   a) Training method: two levels, conventional instruction and self-instruction; and
   b) Gender: two levels (female and male);

2) Dependent Variable: CD-Rom Database Competency adjusted posttest score; and

3) Control Variables:
a) Instructional databases: Wilsondisc and SilverPlatter;  
b) Experience with the microcomputer for database search strategies based upon novice or inexperience user status; and  
c) Motivation to participate (all subjects were volunteers).

Data Collection Procedures

Data were collected during winter term, 1993, using selected classes of OSU undergraduate students. Students were asked to indicate voluntary participation in the study by signing a consent form and by completing a demographic questionnaire. Students who had no formal instruction or training in CD-ROM database searches, or who may have used databases other than Wilsondisc or SilverPlatter, were selected and randomly assigned as subjects to either a conventional instruction or self-instruction group. Each group contained native English-speaking male and female subjects.

All selected participants were pretested using the CD-ROM Database Competency Test (Appendix A) to measure individual knowledge with respect to performance of CD-ROM database searches. Prior to training, an introduction to the CD system and to the Kerr Library CD Center was given to all selected participants. The subjects were taught how
to operate CD-ROM databases using a personal computer, based upon either a conventional training or self-instruction treatments. The total time required to conduct the experiment was six weeks, including an initial meeting during the first week, an instruction training period of four weeks, and a post-training meeting held during the sixth week. During the post-training meeting, all subjects in both the conventional instruction and self-instruction groups were posttested using the CD-ROM Competency Test. Subjects were then asked to complete subject evaluation forms.

Conventional Instruction Training

Conventional instruction training covered four lessons on the Wilsondisc indexes and three lessons on the Silver-Platter databases. Students selected class sessions that met with individual scheduling time requirements. Subjects were instructed for one hour twice each week for four weeks. Subjects were then asked to complete a series of tasks and assignments for each lesson. Time lines and content outlines are shown in Appendix F. All assignments were corrected by the researcher.

Self-Instruction Training

Subjects assigned to the self-instruction group were expected to use the vendors' printed manuals, In-House CD user's guides, and the key templates provided with each
database to learn how to perform CD-ROM database searches at their own pace. They were asked to complete assignments twice each week that were identical to those assigned to the conventional instruction group. Subjects were allowed to use only online help resources and the help guides provided at the CD center, Kerr Library (OSU). The researcher assisted subjects only with the use of the function keys and did not provide assistance with the development of search strategies. Subjects performed CD-ROM database searches and assignments at their own convenience within a time frame of approximately four weeks.

Summary

The present study consisted of a true experimental pretest-posttest control group design. The Delphi method was utilized to validate content-related evidence of validity for the CD-ROM Database Competency Test. Thirty-seven native English-speaking volunteer undergraduate students from various classes at OSU were randomly divided into two training groups, including conventional and self-instruction treatments. The length of the study was six weeks.

Conventional instruction was given for one hour, two times per week for four weeks. The self-instruction group was assigned to use only institutional and vendor provided manuals and online (disc-based) help aides to complete the
weekly assignments. Both groups received the same weekly worksheets. All participants were given the CD-ROM Data-
base Competency Test before and after the training. The ANCOVA was used to test results for null hypotheses 2, 3, and 4, and the t-test was used to assess hypothesis 1.
CHAPTER IV

THE RESULTS OF THE STUDY

Introduction

This chapter reports the results of the study. The objective of the study was to provide an understanding of the training techniques required to facilitate end-user CD-ROM database searches. The two training procedures (treatments) used in the study were a conventional instruction method and a self-instruction method. The study's hypotheses were to determine if there were:

1) pretest and posttest mean score differences on the CD-ROM database competency test for students placed in conventional instruction and self-instruction group,

2) adjusted mean score differences on the CD-ROM database competency test between the subjects placed in conventional instruction and in self-instruction groups,

3) adjusted mean score differences on the CD-ROM database competency test between male and female subjects, and

4) the presence or absence of interaction effects for levels of training methods and for gender
among subjects on the CD-ROM database competency test.

Reliability of the CD-ROM Database Competency Test

The CD-ROM database competency test is a multiple choice test which has responses valued as 1 for each correct item and 0 for each incorrect item. The Kuder-Richardson (K-R 20) procedure was utilized to determine the reliability of the CD-ROM database competency test. The Kuder-Richardson (K-R 20) formula is as follows:

\[ K-R\ 20\ \ r = \frac{k}{k-1} \left[ 1 - \frac{\Sigma p_i q_i}{\sigma^2} \right] \]

Where:
- \( k \) is the number of the test items
- \( \Sigma p_i q_i / \sigma^2 \) is the sum of the individual item variances
- \( \sigma^2 \) is the variance of the score total of individual subjects
- \( n \) is the total number of the subjects
- \( p_i = \frac{\text{number of subjects who got item } i \text{ correct}}{\text{number of subjects}} \)
- \( q_i = 1 - p_i \)
- \( \sigma^2 = \frac{\Sigma f x^2 - (\Sigma f x)^2}{n(n-1)} \)
When the K-R 20 formula was applied to the study's test scores, the resulting correlation was computed as .63. This result reflects a degree of association for internal consistency in the instrument. The reliability was considered to be acceptable for the study.

Statistical Testings

The design of the study was a pretest-posttest control group model (Campbell & Stanley, 1966). STATGRAPHIC version 5.0 was utilized to calculate the results for the study. The computation utilized the Type III sum of squares procedure, which is used for unbalanced designed data and computes the additional sum of squares for each factor as if it were added to the model last. A two-tailed paired t-test was applied to answer Hypothesis 1 and ANCOVA was utilized to respond to Hypotheses 2, 3 and 4. The null hypotheses included the following:

1) There is no significant difference between pretest mean score and posttest mean score on the CD-ROM database competency test for students instructed by the conventional instruction group and subjects taught by self-instruction.

\[ H_{01}: \mu_{\text{Pretest}} = \mu_{\text{Posttest}} \]

2) There is no significant adjusted mean score difference on the CD-ROM competency test between groups of students instructed by the conventional
instruction and subjects taught by self-instruction.

\[ H_{02}: \mu_{\text{Instruct}} = \mu_{\text{Self-Instruct}} \]

3) There is no significant adjusted mean score difference on the CD-ROM database competency test between male subjects and female subjects.

\[ H_{03}: \mu_{\text{Male}} = \mu_{\text{Female}} \]

4) There is no significant interaction for adjusted mean scores on the CD-ROM competency test between levels of training method and gender.

\[ H_{04}: \mu_{\text{Instruct x Male x Female}} = \mu_{\text{Self-Instr x Male x Female}} \]

Findings of the study

The dependent variable in this experiment was the CD-ROM database competency test score, which measured the basic skills of CD-ROM database searches. The test was utilized in order to assess the improvement of comprehension skills made by each participant and was administered before and after the 6-week training period. A sample of 37 native English-speaking undergraduate students at Oregon State University provided data for the study.

A two-tailed t-test performed on the pretest and posttest mean scores indicated that a significant difference (p < .05) existed when data were analyzed for all participants (see Table 2). The posttest mean score was found to be higher than the pretest for the combined treat-
ment groups with the difference occurring in favor of the posttest.

<table>
<thead>
<tr>
<th>Test Scores</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Computed t Value</th>
<th>D.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post - Pretest</td>
<td>37</td>
<td>3.973</td>
<td>2.6298</td>
<td>9.18949*</td>
<td>36</td>
</tr>
</tbody>
</table>

*Significance level at .05

This result was not unexpected; it was assumed that students would have significantly higher scores on the posttest, regardless of their membership in the two (2) instructional groups.

Table 3 reports the pretest and posttest mean scores. As shown in Table 3, those students who received conventional instruction had slightly higher pretest scores than did those in the other group. This trend carried into the posttest result as well. However, when these data were subjected to analysis using the t-test, pretest scores were found not to be significantly different for the two methods. Posttest raw score results did show a significant difference in favor of the conventional method sample.
Table 3. Training Methods Pretest and Posttest Mean Scores

<table>
<thead>
<tr>
<th>Training Methods</th>
<th>Number of Students</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Instruction</td>
<td>22</td>
<td>7.045</td>
<td>11.409</td>
</tr>
<tr>
<td>Self-Instruction</td>
<td>15</td>
<td>5.800</td>
<td>9.200</td>
</tr>
</tbody>
</table>

Pretest and Posttest gender mean scores are presented in Table 4. Gender differences were non-existence when raw scores were analyzed using the ANCOVA.

Table 4. Pretest and Posttest Gender Mean Scores

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of Students</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>20</td>
<td>6.750</td>
<td>10.450</td>
</tr>
<tr>
<td>Males</td>
<td>17</td>
<td>6.294</td>
<td>10.588</td>
</tr>
</tbody>
</table>

The graphic presentation of the two training method mean scores and gender mean scores from above tables were also displayed by the histogram bar charts (see Appendix G).

Figure 1 shows the scatterplot for pretest and posttest raw scores.
The resulting correlation between pretest and posttest scores was determined to be .63. This correlation was found to be significant at the .05 level.
The pretest mean scores of the two instructional methods did not show significant differences. Table 5 displayed the results of the significant testing of the pretest mean scores different between conventional instruction and self-instruction groups.

<table>
<thead>
<tr>
<th>Table 5. Descriptive Pretest Results for the Two Instructional Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Scores</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Conventional Instruction</td>
</tr>
<tr>
<td>Self-Instruction</td>
</tr>
</tbody>
</table>

The results indicated that there were no significant pretest differences between the two instructional groups ($t = 2.0142$, df = 35, $\alpha > .05$).

Two-way analysis of covariance was utilized for the testing of significance differences for main effects. Testing was initially completed to include interaction to establish whether levels of group and gender means were significantly different. The F-test showed that there was no significant interaction effect for the data. Therefore, the interaction source of variation was dropped from the analysis for purposes of establishing the existence of differences between adjusted mean scores for the two (2)
main effects (group and gender). Consequently, the pooling of the interaction degree of freedom with that of the error term strengthened the power of the significance testing by mathematically decreasing the value of the error mean square. The decision was made to analyze the data using the Type III sum of squares model for analysis of covariance without testing for interaction. These results are shown in Table 6:

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>D.F.</th>
<th>Mean Square</th>
<th>F-ratio</th>
<th>Sig. Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVARIATES Pretest</td>
<td>18.9186</td>
<td>1</td>
<td>18.9186</td>
<td>3.230</td>
<td>.0814</td>
</tr>
<tr>
<td>MAIN EFFECTS Groups</td>
<td>25.0617</td>
<td>1</td>
<td>25.0617</td>
<td>4.279</td>
<td>.0465*</td>
</tr>
<tr>
<td>Gender</td>
<td>2.5698</td>
<td>1</td>
<td>2.5698</td>
<td>.439</td>
<td>.5193</td>
</tr>
<tr>
<td>RESIDUAL</td>
<td>193.2722</td>
<td>33</td>
<td>5.8567</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL (CORR.)</td>
<td>257.2432</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significance at the .05 level.

The results indicated that there was no significant difference between pretest mean scores ($\alpha = .08$), but that differences did exist for adjusted mean scores representing group effect.
Tables 7, and 8 present the adjusted means of CD-ROM database competency test scores on training methods and gender.

**Table 7. Adjusted Mean Training Method Scores**

<table>
<thead>
<tr>
<th>Training Methods</th>
<th>Number of Students</th>
<th>Adjusted Mean</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Instruction</td>
<td>22</td>
<td>11.2294</td>
<td>.04</td>
</tr>
<tr>
<td>Self-instruction</td>
<td>15</td>
<td>9.4706</td>
<td></td>
</tr>
</tbody>
</table>

These results verify that gender differences did not exist for the sample means in the study. However, the sample receiving the instructional method scored significantly higher on the CD-ROM database competency test than did the sample which participated in self-instruction (p = .04).

**Table 8. Adjusted Mean Gender Scores**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number of Students</th>
<th>Adjusted Mean</th>
<th>P- Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>20</td>
<td>10.0543</td>
<td>.51</td>
</tr>
<tr>
<td>Males</td>
<td>17</td>
<td>10.6458</td>
<td></td>
</tr>
</tbody>
</table>
Demographic Survey Results

Demographic information collected during the study showed that most participants were liberal arts and science majors. More juniors participated in the research than did students from other classes. A graphic display of these data are shown in Figures 2 and 3.

![Pie chart showing undergraduate status data]

Figure 2. Undergraduate Status Data.
Figure 3. Academic Classification Data.

Status and classification data were not used as independent variables in the study. They are reported for purposes of describing the population of interest of the research. Demographic data for the study revealed that the participant ages ranged from 18 to 44 years and that the average age was 20 years old. Most participants in this study were familiar with microcomputers and software such as word processing, spreadsheet and database. Perhaps college students in the 80's may have grown up with the technology age, which allowed them to experience some computer software applications.
Student Evaluation Results

Supplemental to the study were student evaluations. At the end of the experiment and after the posttest was given, all students were asked to evaluate the CD-ROM database training. The results of student evaluations showed that 89% of the participants rated formal training as being very helpful and saved them time in retrieving information, and improved the effectiveness of their searches. When they were asked how necessary is formal training in searching CD-ROM databases, 46% rated it as very necessary and 54% rated formal training as being somewhat necessary. While 84% of the participants preferred to receive conventional instruction, 8% preferred the combination of both conventional instruction and self-instruction, and 8% had no preference.

Regarding the paper manuals and user's help guides, 40% of the students in the self-instruction group reported using the manual and help guides, 47% sometimes used the manual and help guides, and 13% did not use any manual or help guides. When students were asked how they used the paper manuals and help guides in their searches, 80% reported using the manual only when they could not figure something out, 13% said they did not use the manuals, and 7% actually read the manuals and help guides before and during assignments when they could not figure something out. Fifty-three percent felt the paper manual and help
guides were somewhat helpful, 27% said they were very helpful, 13% rated not helpful and 7% said they were not applicable. The results showed that 33% of the students in the study reported using the user’s manual for ERIC Silver-Platter and 75% of those who used the manual rated it at 3 or less out of 5 on clarity. Most students were satisfied with the length of the training, but some preferred to receive instruction three times per week or extend it to one or two more weeks. The students in the conventional instruction group commented that they felt more confident in performing the CD-ROM database searches than did those in the other group.

Summary

In conclusion, the results of the study revealed the following:

1) The internal consistency reliability of the instrument was found to be .63, which was considered to be adequate for purposes of collecting data for the study.

2) When all treatment samples were combined, the posttest mean score was significantly higher than the pretest mean score on the CD-ROM database competency test.
3) There was a significant adjusted mean score difference on the CD-ROM competency test between groups of students instructed by the conventional instruction method and subjects taught by self-instruction.

4) There was no significant adjusted mean score differences on the CD-ROM database competency test between male and female students.

5) There was no significant interaction between levels of training method and gender.

6) In the evaluations, students rated formal training as being very helpful in improving the effectiveness of their CD-ROM database searches.

Thus, the CD-ROM database competency test was considered appropriate for the research. The results substantiated that, for these samples, the instructional method used in the study provided significant assistance to students in their understanding of CD-ROM applications.
CHAPTER V

CONCLUSIONS, DISCUSSIONS AND SUGGESTIONS

Introduction

This chapter presents the summary of the study, conclusions, a discussion of the findings, and suggestions for further study. The goal of the study was to recommend an effective training method to facilitate end-users to successfully utilize CD-ROM database technology.

Summary of the Study

Problem statement

The primary question to be answered as a result of the research was: Do native English-speaking undergraduate students learn CD-ROM database search skills more effectively through the use of conventional instruction method or by training confined to a written manual self-instructional method?

Research objectives

The purposes of the study were to determine if there were: 1) Pretest and posttest mean score differences on the CD-ROM database competency test for students placed in
conventional instruction and self-instruction group; 2) adjusted mean score differences on the CD-ROM database competency test between subjects placed in conventional instruction and in self-instruction groups; 3) adjusted mean score differences on the CD-ROM database competency test between male and female subjects; and 4) the presence or absence of interaction effects for levels of training methods and gender on the CD-ROM database competency test.

The Null Hypotheses statements

The following null hypotheses were tested at the .05 significance level:

1) There is no significant difference between pre-test mean score and posttest mean score on the CD-ROM database competency test for students instructed by the conventional instruction group and subject taught by self-instruction.

2) There is no significant adjusted mean score difference on the CD-ROM competency test between groups of students instructed by the conventional instruction and subjects taught by self-instruction.

3) There is no significant adjusted mean score difference on the CD-ROM database competency test between male subjects and female subjects.
4) There is no significant interaction for adjusted mean scores on the CD-ROM competency test between levels of training method and gender.

Methodology and Data Collection

Subjects

Subjects used in the study consisted of a total of thirty-seven (37) native English-speaking undergraduate students enrolled at Oregon State University. None of the subjects who participated in the study had formal CD-ROM database training.

Instruments and supportive resources

The study employed the following instruments and supportive resources:

1) The CD-ROM database competency test, consisting of sixteen multiple choice questions,

2) A demographic questionnaire,

3) CD-ROM search instruction,

4) CD-ROM databases (Wilsondisc, SilverPlatter), and

5) Subject evaluations.

A panel of 5 experts from the University of Oregon, Western Oregon State College and Oregon State University was formed to determine content related evidence of validity for the CD-ROM database competency test. The reliabili-
ty of CD-ROM database competency test was .63, which was computed using the Kuder-Richardson (K-R 20) formula. The reliability was calculated from data, which were collected by subjects who participated in the study and indicated the internal consistency reliability of the CD-ROM instrument.

Design of the study

A pretest-posttest/control group design (Campbell & Stanley, 1966) was utilized for this study. Volunteer native English-speaking students were randomly assigned to one of two training methods (conventional instruction and self-instruction). The length of the study was six weeks. All participants were premeasured using the CD-ROM database competency test prior to the application of any treatments. Students received training two times a week for four weeks. Students in the conventional instruction group learned CD-ROM procedures using formal instruction while students in the self-instructional group were assigned to the use of paper manuals. During the week following the training all students were postmeasured using the CD-ROM database competency test.

The study was designed to determine if the conventional instruction method would significantly increase student CD-ROM database competency test scores when compared with the other method. The design of the study considered if
gender and training methods were factors in effecting differences in the CD-ROM database competency score.

Data analysis

The analysis of covariance and the t-tests were the primary statistics used for analyzing differences for mean scores of the CD-ROM database competency test.

Conclusions of the Study

The results of the analyses enabled the study researcher to arrive at the following conclusions:

1) Subjects in both treatment groups experienced significant pretest-posttest gains in the CD-ROM database competency test score.

2) Those subjects which were assigned to the conventional instruction group had significantly higher scores on the CD-ROM database competency test than did subjects who participated in the self-instruction group.

3) Subject gender was determined not to be a factor when differences were considered from test results.

4) Interaction did not play a significant role in influencing the data results.

The major conclusion drawn from the study was that the native English-speaking students at Oregon State University
learned CD-ROM searching skills more effectively through the conventional instruction method than those student who were trained by self-instruction. A comparison of learning CD-ROM database searches for male and female college students failed to yield significant differences.

Discussion of the Findings

This study found that the conventional instruction method was effective in training CD-ROM database searches for college students, a conclusion supported by Stewart and Olsen (1988). The study was intended to determine whether the use of selected training methods, either through human interaction in a classroom-like setup or with paper manuals and help guides, could influence learning CD-ROM databases searches. The study confirmed that, when provided with some formal instruction, the end-users did search more effectively and successfully. This finding concurs with the statements of a number of researchers (Bostian & Robbins, 1990; Culbertson, 1992; Haines, 1982; Nash & Wilson, 1991; Stewart & Olsen, 1988). Student evaluations from the current study samples reported that some students may have difficulty understanding the paper manuals. This result is similar to data reported by Rholes and Caldwell-Wood (1987).

The results of the present study identified a significant increase between pretest and posttest CD-ROM database
competency mean scores for the conventional instruction group. On the other hand, the mean CD-ROM database competency score of students in the self-instruction group, assigned to use the paper manuals and help guides, reflected a slight but not significant increase between pretest and posttest scores.

The content of the conventional instruction was focused on five goal objectives as suggested by Johnson and Rosen (1990): 1) What information is stored in the Wilsondisc and SilverPlatter databases; 2) the basic searching strategies of the Wilsondisc and SilverPlatter databases; 3) what documents will be retrieved and how to retrieve specific information on the Wilsondisc and SilverPlatter databases; 4) how to structure the search in both Wilsondisc and SilverPlatter databases; and 5) how to use the Boolean (logical) operators and other connectors in the Wilsondisc and SilverPlatter databases. In addition, the search strategy worksheet utilized in the study were methods which were originally employed by Reddy (1988).

The instruction goal was to teach students the theoretical framework of basic skills advocated by many researchers (Charles & Clark, 1990; Johnson & Rosen, 1990; Silvia & Kilman, 1991). It was found that the end-users lacked the ability to transfer the basic search skills from one system to another. Since each database covers information which might overlap another database, may hold a different type of journal, and may be produced by a different vendor,
teaching the basic skills helps to facilitate the end-users with effective database searches. The assignments given to the subjects in the study provided hands-on experience with various problem selections. Subjects in the instruction group received exercises to practice what they had just learned and they had to do them on their own. They were allowed to ask questions. Subjects in the self-instruction group received the same exercises and they were expected to use the paper manual to help them solve the problems. The topics on the assignments were general knowledge to the students. The assignments were reviewed by an expert in the field and field tested by four (4) novice users for clarity of the instruction. These assignments were considered to be meaningful learning as a process of connecting new material to knowledge already existing in memory, and problem solving.

The present study found no significant differences between males and females in learning how to perform database searches. This finding supported by Kamala (1991), who determined that females reflected equal or higher levels of computer affinity and visual ability across academic groups. In her study, there were no significant gender differences in the performance of novice subjects in the use of CD-ROM databases. Some researchers (Eastman, 1991; Nye, 1991) have found that there were differences between males and females in learning computer systems. Allen and Allen (1993) found that females scored higher on
visual perception speed than did their male counterparts. As stressed by Sein and Bostrom (1990), high-visual learners performed better in learning to use the software system than did the low-visual ones. This visual ability may relate to strategy of problem solving. However, this study indicated that if instruction could be provided to both males and females, where they would spent the same amount of time with the computer, and if the background knowledge with computers was similar for both genders, then it may be possible that there would be no differences in learning CD-ROM database searches.

CD-ROM database competency test scores revealed that students still have difficulty understanding Boolean logic, search structures and the transfer the knowledge from one system to the other. For example, the hyphenated terms would not be retrieved by the computer when students typed in the term without the hyphen on the Wilsearch mode of Wilsondisc, but would be retrieved by SilverPlatter. The concept of search structures and Boolean logic were difficult for the students to learn in a short time. It was observed that during the instruction time, students were taught to perform search strategies by breaking down the topic into the concepts and finding the related term for each concept before connecting all terms with appropriate Boolean logic. Some students still typed in the title of the topic into the computer and did not follow the search structure they had just learned. This indicates
that some students may have problems in designing their search structure effectively.

Suggestions for Further Study

Based upon the results of the research, the following are suggested for further study:

1) This study demonstrated that there was a significant difference between conventional instruction and self-instruction on CD-ROM database test scores. More research is needed to determine if the computer-based training or video presentation would be effective as training methods.

2) This study is specific only with regard to the Wilsondisc and SilverPlatter databases. More research is needed using a different database, such as ProQuest databases by University Microform International (UMI).

3) More research is needed to determine the effectiveness of a combination of training methods of conventional instruction and self-instruction and using assignments, in addition to instruction class time, to reinforce the knowledge learned by the student.

4) The length of the present method was to administer treatments two times per week for four weeks of training time. More research is needed in
extending the training to three times per week for an academic quarter or a semester.

5) Research is needed to determine if teaching according to the student’s learning style relates to the learning of the CD-ROM database searches.

Summary

CD-ROM databases claim to be user-friendly, but many researchers emphasized that formal training would help the end-users to be successful and effective in performing CD-ROM database searches. CD-ROM databases are not standardized and the vendors have not developed materials which help train the end-users. The development of CD-ROM database training materials for the current study is considered to be a valuable contribution to the existing resources for instruction in this area.

The CD-ROM database search instruction is not included in the college curriculum at Oregon State University. Student evaluations revealed that more than 80% of the students in the study expressed that they would prefer to be trained by conventional instruction if they had a choice. The results of the study indicate that students don’t learn CD-ROM database searching techniques very well on their own. The study’s findings suggested that college students should receive formal CD-ROM database instruction
in order to be more successful in performing database searches.
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APPENDICES
APPENDIX A

CD-ROM DATABASE COMPETENCY TEST
CD-ROM DATABASE COMPETENCY TEST

Direction: Circle the best answer.

1. In SilverPlatter when you type in the phrase "Air Pollution", the computer will retrieve
   a. ONLY documents which contain the word "Pollution."
   b. ALL documents which contain the phrase "Air Pollution."
   c. ONLY documents which contain the phrase "Air and Water Pollution."
   d. ALL documents which contain the phrase "Polluted Air"
   e. All of above

2. If you search for a subject in Wilsondisc's Browse mode and no records are found, this means:
   a. You should change to a different database.
   b. The subject does not exist.
   c. You should try searching in Wilsearch or Wilsonline modes too.
   d. You should try using a different subject heading, synonym, or a related term.
   e. Both c and d

3. Which statement is true?
   a. The Library contains all journals, articles, and other materials within the CD-ROM databases.
   b. Several databases may have to be searched in order to find complete information on a given topic.
   c. CD-ROM databases are the only resource to search for articles in periodicals or journals.
   d. All CD-ROM databases have abstracts.
   e. Most CD-ROM databases have information from the 1970s.

4. In Wilsearch mode, when you type in "Single parents and child abuse", the computer will retrieve:
   a. Only records which contain the four terms single and parents and child and abuse.
   b. Only records about child abuse in the family.
   c. Only records about parents who abuse their children.
   d. Only records which contain the terms single parent or single-parent and child abuse.
   e. Only records which contain the terms single-parent and child and abuse.
5. In SilverPlatter, when you type in "Teen*" or "Teen?" what is the difference in what the computer retrieves?

a. When you use "*", records will contain the terms: Teens, Teen, Teenager, Teenagers, Teenaging, Teeny, or Adolescents and when you use "?", records will contain the terms: Teens, Teenagers, Adolescents, or Youths.

b. When you use "*", records will contain the terms: Teen, Teens, Teeny, or Juvenile and when you use "?" records will contain the terms: Adolescent or Adolescence.

c. Records will contain the terms: Teens, Teen, Teenagers, Teenager, Teeny, or Teenaging when you use "*" and the records will contain the terms: Teens, Teeny or Teen, when you use "?".

d. Records will contain the terms: Teen, Teeny or Teens when you use "*" and the records will contain the terms: Teen, Teens, Teenagers, Teeny or Teenaging when you use "?".

e. Both a and b

6. What search capability do the Wilsearch and Wilsonline modes and SilverPlatter have in common?

a. You can mark the records to be printed later.

b. You can use the Index searching mode with SilverPlatter but not with Wilsondisc databases.

c. If you have many search sets (terms), you may save your search set using the History-command.

d. You can display any fields you want in the display mode and print any fields you want in the printing mode.

e. You can search a specific author or a specific journal or a specific year for any subject.

7. If your subject is about computer software and you type in "computer software" and the computer retrieves more than 200 records, what will be your next step?

a. You found what you want, therefore you will print all 200 records.

b. Browse titles and descriptors and find some new terms to limit your search.

c. Limit the search by browsing the subject indexes.

d. Look up in the thesaurus for a better term or related term.

e. You should do b, c, and d
8. If you are looking for a specific type of document such as editorial or review articles, what would you do?
   a. Type in the word "editorial or review articles" on my search request.
   b. Find out in the user guides if the database has an option for searching a specific type of document.
   c. Type in "editorial" and "review articles".
   d. This search capability is not available.
   e. Both a and b

9. In SilverPlatter and Wilsonline mode, if your topic is elderly in nursing homes, what terms would retrieve relevant citations?
   a. "(aging or elderly or older adults) and (nursing home or housing)"
   b. "elderly in nursing home".
   c. "elderly and nursing and home".
   d. "elderly and housing".
   e. Try option a and also look up in the thesaurus for related subject term.

10. In SilverPlatter, what would the computer retrieve if you type in "yew and cancer"
    a. All documents that contain the word Yew and cancer including authors named "yew" who did research about cancer.
    b. All documents about the cancer cured by the yew tree.
    c. All documents that have anything to do with any type of cancers.
    d. Documents which contain the word "Yew" in the title and the Journal of Cancer.
    e. Both a and d

11. In Wilsonline, what would the computer do, when you type in "NBR Jackson, Michael"?
    a. Display the listing of the subject indexes.
    b. Display Jackson, Michael as the subject.
    c. Print Michael Jackson documents.
    d. Display the phrase Jackson, Michael in an alphabetically listing of authors, titles and subject headings.
    e. Find documents with Michael Jackson in the title.
12. In SilverPlatter or Wilsonline when you type in "Smoking or Tobacco", the documents found will contain these terms:

a. Smoking, smoke, and tobacco
b. Either the term Smoking or the term Tobacco or both
c. Both terms Smoking and Tobacco
d. Smoke, smoking, tobacco or cigrattes
e. The phrase cigrattte smoking.

13. When you type in "the case study in business" in Wilsonline mode. What would the computer search for?

a. Documents which contain the phrase "the case study in business"
b. Case study documents in the subject of business.
c. All of the case study articles in that database.
d. Documents which contain the phrase "the case study" and the term "business" and combine the two concepts.
e. Documents in the subject indexes.

14. In Wilsonline, when you are looking for an author name "Brown, Murphy" in a journal name "Broadcasting", what would you type in?

a. "Murphy Brown and Broadcasting"
b. "Murphy and Brown and Broadcasting"
c. "Brown, Murphy: (AU) and Broadcasting (JN)" or "(AU) Brown, Murphy: and (JN) Broadcasting"
d. You should do C and also look up the authors and journals in the Index using the NBR command.
e. Wilson databases do not have this option.

15. Which statement below would be a good strategy in searching for the topic of body-weight and exercise programs?

a. "overweight and exercises"
b. "body-weight and fitness"
c. "obesity and exercise near6 fitness"
d. "(overweight or obesity or body-weight) and (exercise? or physical fitness)"
e. "(overweight and obesity and body-weight) and ((exercise? or physical fitness) near6 programs)"
16. In SilverPlatter, what will be the result of set #5?

<table>
<thead>
<tr>
<th>No.</th>
<th>Records</th>
<th>Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>412</td>
<td>vegetable</td>
</tr>
<tr>
<td>#2</td>
<td>1,000</td>
<td>fiber</td>
</tr>
<tr>
<td>#3</td>
<td>5,590</td>
<td>vitamin</td>
</tr>
<tr>
<td>#4</td>
<td>9,800</td>
<td>nutrition</td>
</tr>
<tr>
<td>#5</td>
<td></td>
<td>#1 and (#2 in Ti or #3 in De) and #4 in De</td>
</tr>
</tbody>
</table>

da. find "fiber" in the title field, find "vitamin" in the descriptor field then "OR" them together; find "nutrition" in the descriptor field; find "vegetable" in any field; and combine all sets together with AND.

b. find "vegetable" and "fiber" in the title field, then "OR" with "vitamin" in the descriptor field and "nutrition" in the descriptor.

c. find "vitamin" in the descriptor field and find "nutrition" in the descriptor field, find "fiber" in the title field, and find "vegetable" and the "OR" all terms together.

d. find "vegetable" and "fiber" in the title field, then "OR" with "vitamin" in the descriptor field and combine all terms with "nutrition" in the descriptor field.

e. find "vegetable" in any field, combine with "nutrition" in the descriptor field, combine with "fiber" in the title field "OR" "vitamin" in the descriptor field.
APPENDIX B

A DEMOGRAPHIC QUESTIONNAIRE
A Demographic Questionnaire

Please response to the following questions

All responses will be anonymous and held in strictest confidence.

1. What is your age? ______

2. What is your gender?
   a. Female
   b. Male

3. Are you native English-speaker?
   a. Yes, I am.
   b. No. I am not.

4. What is your ethnic background?
   a. Asian-American
   b. Anglo-American
   c. African-American
   d. Hispanic
   e. Others

5. What is your current status at Oregon State University?
   a. Freshmen
   b. Sophomore
   c. Junior
   d. Senior
   e. Post-baccalaureate
   f. Graduate

6. What is your college name?
   a. Liberal arts
   b. Science
   c. Agricultural sciences
   d. Business
   e. Engineering
   f. Forestry
   g. Health and human performance
   h. Home economics & education
   i. Oceanography
   j. Pharmacy
   k. Others

6. Have you had any previous experience with microcomputers?
   a. Yes
   b. No

6.1. If yes, how often do you use microcomputers?
   a. Once a month
   b. 2-3 times a month
   c. 4-5 times a month
   d. Use regularly
   e. Others, please indicate

6.2. If your answer is yes, please indicate below:
   a. Word processing (wordperfect, MS Word)
   b. Database (D-base)
   c. Spreadsheet (Lotus, Quattro)
   d. Programming languages (Basic, Fortran, Pascal, C++)
   e. Others, please indicate

7. Have you used the Wilsondisc or SilverPlatter databases?
   a. Yes
   b. No

7.1. If yes, please indicate how often?
   a. Once a month
   b. 2-3 times a month
   c. 4-5 times a month
   d. Use regularly
   e. Others, please indicate

8. Have you had formal training on how to perform a database search?
   a. Yes, I have
   b. No, I have not
APPENDIX C

CD-ROM DATABASE SEARCH INSTRUCTION
The appendix materials are included for purposes of clarifying the experimental treatment in the study. These consist of outlines of the instructional content for the group receiving the formal instruction for the research. Details of the instructional proceedings are available from the author upon request.
Lesson 1

TOPIC: Introduction to CD-ROM Technology

GOALS:

1) To provide necessary sources of information in Kerr Library.
2) To provide students with an overview of the CD center and CD-ROM databases.

CONTENT OUTLINE:

1) Introduction to CD-ROM.
2) How the Computer Works.
3) What Information is Stored on the CD.
4) How to Select CD-ROM Database(s).
5) When to Use CD-ROM.
6) Hands-on experience

Lesson 2

TOPIC: Wilsondisc three search modes.

GOALS:

1) To acquire hands-on experience with the PC system and to log on to the Wilsondisc databases.
2) Introduction to basic searches using Wilsondisc.
3) Introduction to browse, Wilsearch, and Wilsonline modes of the Wilsondisc database.

CONTENT OUTLINE

*Wilsondisc* search modes, including:

1) Before Performing a Basic Search.
2) How to Run Efficient Searches.
3) How to Display or Show Records.
4) How to Print Records.
5) Assignment 1.

**Lesson 3**

**TOPIC:** Search Strategies and Basic Search Operators in Wilsearch mode

**GOALS:**

1) Introduction to search strategies using subject terms, synonyms, or a thesaurus.
2) Introduction to search strategies using Boolean operators.
3) Student search performances in Wilsearch mode.

**CONTENT OUTLINE:**

1) Search Strategy.
2) Basic Search Operators.
3) Assignment 2.
Lesson 4

TOPIC: Operating Wilsonline Mode and NBR (or Neighbor command)

GOALS:
1) Introduction to Wilsonline (free text) mode.
2) Performance of command driven index searches using the NBR command.

CONTENT OUTLINE:
1) Wilsonline Mode.
2) NBR Command.
3) Assignment 3.

Lesson 5

TOPIC: Wilsondisc Truncations, Field Qualifiers and Download of Information onto a Floppy Diskette.

GOALS:
1) Using truncation (wildcards) in Wilsearch and Wilsonline modes.
2) Search field qualifiers.
3) Using download options.

CONTENT OUTLINE:
1) Truncations.
2) Search Field Qualifiers.
3) Downloading to Diskette.
4) Assignment 4.
Lesson 6

TOPIC: Basic Searches in the SilverPlatter Databases

GOALS:

1) Introduction to the SilverPlatter databases.
2) Introduction to the free-text search mode.
3) Introduction to the index search mode.
4) Introduction to lateral searching.

CONTENT OUTLINE:

1) Searching a Free-Text Mode.
2) Index Mode.
3) Lateral Searching.
4) Display Menu.
5) Printing Menu.
6) Assignment 5.

Lesson 7

TOPIC: Searching in SilverPlatter Using the Operators (WITH, NEAR, IN), Field Qualifiers, and the History Command.

GOALS:

1) Introduction to the operators (WITH, NEAR, IN).
2) Introduction to the field qualifiers.
3) Introduction to the History command.

CONTENT OUTLINE:

1) The Operators (WITH, NEAR, IN).
2) Searching By Field Qualifiers.

3) Reusing Search Sets With the History Command.

4) Assignment 6.

Lesson 8

TOPIC: Operating Truncations, Thesaurus, and Downloading.

GOALS:

1) Introduction to truncation.

2) Introduction to thesaurus.

3) Introduction to download.

CONTENT OUTLINE:

1) SilverPlatter Truncations.

2) On-line Thesaurus Command in the Medline.

3) Records to Download.

4) Assignment 7.
Assignment 1 Wilsondisc

Name__________________________

Date______________ Time In_________ Time Out_________

******************************************************************
* Read the Assignment Carefully before starting the search. *
* Observe what is on the screen. *
* Please use any check-out materials to complete the assignment. *
* Select A) NETWORK Disks - Search Kerr Library CD Network *
******************************************************************

Select Database: Social Sciences Index

I. Select Browse Mode

1. Type in "happiness"

2. Write down how many entries or citations you find............

3. Find the subject "hard of hearing" using the PgDn key.

4. Find as many as you can on the subjects related to "hard of hearing" and write down the related subject which has the most entries found:.................................

II. Find as many citations as you can on the topic of Automobile seat belts

1. Select Browse Mode

   1.1 Please write down term(s) you type in
       a) Type in subject term(s) or search terms..............
       b) How many entries or records or citations are found............................................

   1.2 If you type in new term(s) or phrase(s), write down
       a) Alternate term(s).................................
       b) How many entries or records or citations are found............................................

   1.3 Print one record for the most recent publication and underline the search term(s).

2. Select Wilsearch Mode

   2.1 Repeat the same search terms as you did on Browse mode
       a) Subject term(s) or search terms......................
       b) How many entries or records or citations are found...

   2.2 If you type in new term(s) or phrase(s), write down
       a) Alternate term(s).................................
       b) How many entries or records or citations are found...
2.3 Write down the name of the author(s) and publication date of the most recent record...

2.4 Print the oldest record and underline the search term(s).

3. Select Wilsonline Mode

3.1 Repeat the same search terms as you did on Browse mode
   a) Subject term(s) or search terms.................................
   b) How many entries or records or citations are found...

3.2 If you type in new term(s) or phrase(s), write down
   a) Alternate term(s)....................................................
   b) How many entries or records or citations are found...

3.3 What happens if you type in "seat belts"
   How many entries are found......................................

3.4 What happens if you type in "seat belts, automobile"
   How many entries are found......................................

3.5 On this Wilsonline mode, what subject term or phrase did you use which found the most entries.........................

III. How many years are covered (Indexed) by Social Sciences Index?

Exit Social Science Index

Select Database: General Science Index

Find as many citations as you can on the topic of recycling paper.

1. Select Browse mode
   1.1 What subject term did you type in?..........................

   1.2 What subject heading has the most citations?.............

   1.3 How many citations do you find..............................

2. Select Wilsearch mode
   Repeat steps 1.1, 1.2, and 1.3
   2.1 What subject term did you type in?.........................
2.2 What subject heading has the most citations? ................

.................................................................

2.3 How many citations do you find? .......................

3. Select Wilsonline mode
   Repeat steps 1.1, 1.2, and 1.3

3.1 What subject term did you type in? .....................

.................................................................

3.2 What subject heading has the most citations? ..........

.................................................................

3.3 How many citations do you find? .......................

Please answer the following questions in your own word:

1. What is the BROWSE mode used for?

2. What is the WILSEARCH mode used for?

3. What is the WILSONLINE mode used for?

4. What does the F5 function key do?

Please Exit Wilsondisc when you completed the assignment.

Please remember to attach the two print-outs to this assignment.
Assignment 2 Wilsearch mode on Wilsondisc

Name ________________________________

Date ________________ Time In __________ Time Out __________

******************************************************************
* Read the Assignment Carefully before starting the search. *
* Observe what is on the screen. *
* Please use any check-out materials to complete the assignment. *
* Select A) NETWORK Disks - Search Kerr Library CD Network *
******************************************************************

Select Database: General Science Index

Select Wilsearch mode

1. Type in "waste, utilization of paper"
   Write down how many entries or citations you find

2. Type in "waste utilization paper"
   Write down how many entries or citations you find

3. Type in "national parks"
   Write down how many entries or citations you find

4. Type in "/national parks"
   4.1 Write down how many entries or citations you find

   4.2 Modify this search by adding the term "forest"
   On the screen you should have the following:
   Subject Words: /national parks
   2nd Subject: forest

   4.3 Write down how many entries or citations you find

   4.4 Modify this search by adding the term "/forest"
   On the screen you should have the following:
   Subject Words: /national parks
   2nd Subject: /forest

   4.5 Write down how many entries or citations you find

5. How many articles has this author, Brown, Arthur M., published
   in "Science" journal?

6. Find the author of the following citation:
   Title: Common sense guide to growth and nutrition

   Journal: Journal of the american dietetic association v92, p1181-2
   September '92

   Write down the author's name you find
**Search Strategy**

- Write out the topic to be searched on the top line.
- Breakdown your search topic into major concepts.
- Identify the special terms and/or phrases that clearly describe the topic to be searched and/or use a thesaurus to find appropriate words or terms.
- List possible synonyms, related terms or singular-plural terms (check for accurate spelling) and combine all terms with the boolean "OR".
- Combine all concepts with the boolean "AND".

<table>
<thead>
<tr>
<th>First concept</th>
<th>AND</th>
<th>Second concept</th>
<th>AND</th>
<th>Third concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
</tr>
</tbody>
</table>

Example: If you want to find articles about how snakes eat their prey, the first concept is snakes, second concept is eat and third concept is prey.

1. Combine all possible synonyms or related terms with the boolean "OR"

   First concept terms are a. snakes OR snake
   Second concept terms are b. eat OR eating OR feed OR feeding
   Third concept terms are c. pray OR prays OR food OR foods

2. Combine all terms together with the boolean "AND"

   (snakes OR snakes)
   AND
   (eat OR eating OR feed OR feeding)
   AND
   (prey OR preys OR food OR foods)

3. Another possible way would be:

   snake OR snakes
   AND
   foods OR food OR feed OR feeding
   AND
   habit OR habits

I. Your search topic is: **Nutrition related to child growth.**

Select General Science Index and Select Wilsearch Mode
1.1 Write down the search topic concepts:

Concept1
Concept2
Concept3

1.2 You may use a Thesaurus to find appropriate words, terms or subject headings

1.3 List Terms (Subject terms, Descriptors, Subject Headings, synonyms, related terms, singular-plural terms)

<table>
<thead>
<tr>
<th>List of terms for concept1</th>
<th>List of terms for concept2</th>
<th>List of terms for concept3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td>AND</td>
<td>AND</td>
</tr>
<tr>
<td>OR</td>
<td>OR</td>
<td>OR</td>
</tr>
<tr>
<td>OR</td>
<td>OR</td>
<td>OR</td>
</tr>
<tr>
<td>OR</td>
<td>OR</td>
<td>OR</td>
</tr>
</tbody>
</table>

1. Type in all terms listed for concept1 by using the Boolean "OR"
2. Type in all terms listed for concept2 by using the Boolean "OR"
3. Type in all terms listed for concept3 by using the Boolean "OR"
4. Combine all concepts by using the Boolean "AND"
5. Write down how many entries or citations you find.

II. Find as many citations as you can on the topic of the population of deer which have white tails.

Write down how many entries or citations you find.

III. Please answer the following questions in your own words:

1. In Wilsearch mode, what do you do when you want to combine all search terms with the Boolean "AND"?

2. In Wilsearch mode, what do you do when you want to combine all search terms with the Boolean "OR"?

3. What is the "/" symbol used for?
Search Strategy Work Sheet

1. Search topic is: the population of the deers which have white tail.

2. Write down the search topic concepts:
   
   Concept1
   Concept2
   Concept3

3. Identify the special terms and/or phrases that clearly describe the topic to be searched and/or use thesaurus (or library of congress subject headings book) to find appropriate terms or subject headings.

4. List possible synonyms, related terms or singular-plural terms (check for accurate spelling) and combine all terms with boolean "OR".

<table>
<thead>
<tr>
<th>First concept</th>
<th>AND</th>
<th>Second concept</th>
<th>AND</th>
<th>Third concept</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
<td>OR</td>
<td></td>
</tr>
</tbody>
</table>

5. Combine all concepts with boolean "AND".
Assignment 3 Wilsonline mode on Wilsondisc

Name ____________________________________________

Date ____________________ Time In ________ Time Out ________

*******************************************************************
* Read the Assignment Carefully before starting the search. *
* Observe what is on the screen. *
* Please use any check-out materials to complete the assignment.*
* Select A) NETWORK Disks - Search Kerr Library CD Network *
*******************************************************************

Select Database: Social Sciences Index
Select Wilsonline mode

1. Type in "children bonding"
   Write down how many entries or citations you find.

2. Type in "children AND bonding"
   Write down how many entries or citations you find.

3. Type in "children OR child"
   Write down how many entries or citations you find.

4. Type in "bonding OR attachment"
   Write down how many entries or citations you find.

5. Type in "(children or child) and (bonding or attachment)"
   Write down how many entries or citations you find.

6. Type in "(children or child) and (bonding or attachment) and mother"
   Write down how many entries or citations you find.

7. Type in "children and attachment and mother"
   Write down how many entries or citations you find.
   Display and view all citations
   Add a phrase to this search by typing in:
   "children and attachment and mother not child development"
   Display and view all citations

8. Type in "brown, judith"
   Write down how many citations you find.

9. Type in "nbr brown, judith"
   Type in "get 11"
   Write down how many citations you find.

10. Type in "nbr brown, judith"
    Type in "get 7-12"
    Write down how many citations you find.
    Type in "nbr pacific affairs"
    Type in "get 7"
    Write down how many citations you find.
    Combine these two search sets with the Boolean "AND"
    Write down how many citations you find.

I. Select Social Sciences Index and Select Wilsonline mode
1. Find as many citations as you can on the topic of Adolescents attitudes toward Aids disease.

Write down how many citations you find..........................

2. Find the author(s) and volume number of this article

Title: Strategies for coping with food consumption shortage in the Mandara Mountains region of north Cameroon

Journal: Social Science & Medicine p. 2117-27 '82

Write down the author(s) name.................................

.................................................................

Write down the volume number.............

3. Find how many articles each of these authors published?

..............Barbara Brown
..............Barbara A. Brown
..............Barbara B. Brown

II. Please answer the following questions in your own words:

1. What is the Boolean "AND" used for?

2. What is the Boolean "OR" used for?

3. What is the Boolean "NOT" used for?

4. What do you think the Neighbor (NBR) command does?

5. If you want to find the author name Colleen Johnson, and the articles she wrote about elderly and family relationships.

What would you do? Please explain
Assignment 4 Wilsonline mode on Wilsondisc

Name______________________________________________
Date_________________ Time In__________ Time Out________

*****************************************************************
* Read the Assignment Carefully before starting the search. *
* Observe what is on the screen.  *
* Please use any check-out materials to complete the assignment.*
* Select A) NETWORK Disks - Search Kerr Library CD Network *
*****************************************************************

Select Agriculture - Biological Sciences
Select database: Biological & Agricultural Index

1. Type in "vitamin"
   Write down how many entries or citations you find............
   Type in "vitamins"
   Write down how many entries or citations you find............
   Type in "vitamin or vitamins"
   Write down how many entries or citations you find............
   Type in "vitamin#"
   Write down how many entries or citations you find............
   1.1 Can you use this "#" symbol in Wilson or Wilsonline
       modes or both?

   1.2 What happens when you type in "colo#r"

2. Type in "deficiency or deficiencies or deficient"
   Write down how many entries or citations you find............
   Type in "deficien:"
   Write down how many entries or citations you find............

3. Type in "johnson, a"
   Write down how many entries or citations you find............
   Type in "johnson, a:"
   Write down how many entries or citations you find............
   Type in "nutrition and johnson, a:"
   Write down how many entries or citations you find............
   Display and view all citations
   3.1 Can you use this ":" symbol in Wilson or Wilsonline modes or
       both?

   3.2 What happens when you use ":" after the term?
      Example: type in "reserv:"
4. Type in "nutrient"
Write down how many entries or citations you find.............

Type in "nutrient (sh)"
Write down how many entries or citations you find.............

5. Type in "(sh) deficiency and vitamins and children and nutrition"
Write down how many entries or citations you find.............
Display and view all citations

6. How many citations did these two authors have published together? Lurie, Susan and Klein, Joshua

I. Select your own topic or choose from the following topics
   Greenhouse effects and environment
   Alcohol related accidents
   Using computers to teach handicapped students
   How violence on television and in films effects children

1. Write down your topic..............................................
2. Write down the Wilsondisc database(s) you have selected
   (you may use more than one database)

.................................................................

3. Select 10-15 citations from your searches on the topic that you have chosen.

4. Save (Download) these citations on the provided floppy disk,
5. Named your file "home4"

Note: please select the citations which can be found in Kerr Library.
The citations should relate to the topic you have chosen as much as you can.

At the CD center:  3.5  is B drive
                   5.25 is A drive
                   PRN  is printer

At Rm. 202 MCC:  3.5  is A drive

II. Please answer the following questions on your own words:

1. What is the "#" used for?

2. What is the "::" used for?
Assignment 5 SilverPlatter

Name

Date_________ Time In_________ Time Out_________

*****************************************************************
* Read the Assignment Carefully before starting the search. *
* Observe what is on the screen. *
* Please use any check-out materials to complete the assignment.*
*****************************************************************

Introduction to SilverPlatter databases.
The following CD-ROM databases are produced by SilverPlatter:

Agricola
Agrisearch
Biological Abstracts
CAB Abstracts
Eric
GeoRef
Medline
MLA Bibliography
NTIS
Predicast's F&S Index
PsycLit

You may check-out the following materials in the Box:

* SilverPlatter Quick Reference (Biological Abstracts on Compact Disc)
* SPIRS User's Manual (Small Gray Ring-Binder)
* SPIRS Full Text Quick Reference Guide
* CD User Guide: SilverPlatter
* Ask CD Monitor for SilverPlatter Key Template

Select A) NETWORK Disks - Search Kerr Library CD Network
Select A) Agriculture - Biological Sciences

1. Searching in Free text, Index and Lateral searching

Type in "defrost"
Type in "defrosted"
Type in "defrosting"

1.1 Combine these three sets using the Boolean "OR"
On the screen you should have the Following:
"defrost or defrosted or defrosting" (you may use search statement numbers)

1.2 Display all citations found.

1.3 Select the term "preparation" (use lateral searching) from
the Abstract field in citation title: Food: handle with care

1.4 Use the Index command and retrieve the phrase "food-safety"
1.5 Combine all terms from 1.1, 1.3, 1.4 with the Boolean "AND"
1.6 Write down how many citations you find.................

**Go back to Free text search mode and start a new search

2. from 2.1 through 2.12 are continuing searches
2.1 Type in "tropical rainforest"
2.2 Type in "tropical rain forest"
2.3 Use the Index command and retrieve the following phrase:
   "tropical-rain-forests"
2.4 Combine sets for those terms.
2.5 Display records found.
2.6 Change display menu to show only Title and Descriptors
2.7 Use lateral searching to retrieve the following terms:
   "Mexico and Costa-Rica" in the descriptor field
2.8 Combine sets from lateral searching to broaden (increase) the
   search results
2.9 Combine previous sets (2.4) with this set (2.8). There should
   be 89 citations.
2.10 Display records found.
2.11 Mark records 1 and 3
2.12 Change print menu to print field: CITN and then print the
   Marked records.

3. Use two or three search techniques to find as many citations as you
   can on the topic of making wines by the fermentation
   Write down how many citations you find..................

4. Please answer the following questions on your own words:
   1. What is Free text searching for?
   2. What is Index searching?
   3. What is Lateral searching?
Assignment 6 SilverPlatter

Name

Date Time In Time Out

******************************************************************************
* Read the Assignment Carefully before starting the search.  *
* Observe what is on the screen.  *
* Please use any check-out materials to complete the assignment.*
* Select A) NETWORK Disks - Search Kerr Library CD Network *
******************************************************************************
Select Agricultural - Biological Sciences
Select Agricola (1984-1992)

DO NOT CLEAR THE SEARCHES OR SCREEN ON THIS ASSIGNMENT

I. Connectors WITH, NEAR and NEAR#
   a.) Type in "soybean AND cooking"
   b.) How many citations did you find?.........................
   c.) Display and view some of the records found.
       In what fields (ti, de, ab, etc.) were the terms found in
       the citations?

   d.) Type in "soybean WITH cooking"
   e.) How many citations did you find?.........................
   f.) Display and view some of the records found.
       In what field(s) were both terms found in the citations?

   g.) Type in "soybean NEAR cooking"
   h.) How many citations did you find?.........................
   i.) Display and view some of the records found.
       Do both terms appear in the same sentence on the citations?

   j.) Type in "soybean near3 cooking"
   k.) How many citations did you find?.........................
   l.) Display and view all citations found.
   m.) Type in "soybean near2 cooking"
   n.) Display and view all citations found
   o.) Repeat j to n with the terms "chicken near3 cooking"
   p.) How many words were allowed in between the terms in the
      citations when you connect them with the following?

       Near3..................................................
       Near2..................................................

II. Searching By Field Qualifiers
2.1 Type in "smoked fish in de"
Display the citations and change display options to show: CITN,DE

   What field(s) do the terms "smoked fish" appear in the citations?

2.2 Type in "smoked salmon in ti"
Display and view all citations
What field(s) do the terms "smoked salmon" appear on the
   citations?
2.3 Find the author(s) and volume number of this article

Title: Effect of heating variables and storage on color of chicken cooked and stored in polyester pouches
Source: Poultry science. October 1992

Write down the author(s) name...............................
........................................................................
Write down the volume number...............................

2.4 Type in "groundwater and drinking and water-quality"

2.4.1 Type in "py=1992"
Combine 2.4 and 2.4.1 with the Boolean "AND"
Display and view all citations
How many citations were published in 1992?...........

2.4.2 Type in "py>1990"
Combine 2.4 and 2.4.2 with the Boolean "AND"
Display and view all citations
How many citations were published after 1990?.......

2.4.3 Type in "py>=1991"
Combine 2.4 and 2.4.3 with the Boolean "AND"
Display and view all citations
How many citations were published since 1991?.......

2.5 Type in "(tippett and mickle and roidt) in au"

What field(s) do these three terms appear on the citations?
........................................................................

Write down the title of this article.............................
........................................................................

3.6 What are the differences when you typed in
"Sweet and Fruits and Crops" and when you typed in
"Sweet in au and (fruits and crops) in de"

III. Use History command key
3.1. Save Search options to Drive A:
-Change filename to: Lesson6.str

3.2. Quit Agricola 1984-1992

3.3. Select Agricola 1979-84
3.4. Use History command key
-Run Search sets: Lesson6.str

3.5. Write down how many citations found in Agricola 1979-1984 on each of the following search sets:

3.4.1 soybean and cooking.................................
3.4.2 soybean with cooking..............................
3.4.3 soybean near cooking..............................
3.4.4 soybean near3 cooking............................
3.4.5 soybean near2 cooking............................
3.4.6 chicken near3 cooking............................
3.4.7 chicken near2 cooking............................
Please answer the following questions in your own words:

1. What are the differences between using the connectors "WITH" and "AND"?

2. What are the differences between using the connectors "NEAR" and "NEAR2 or NEAR3 or NEAR5"?

3. Explain the advantage(s) of using each of the operators (AND, WITH, NEAR, and NEAR3).

Please remember to turn in the floppy disk with this assignment.
Assignment 7 SilverPlatter

Name__________________________

Date_________________ Time In_________ Time Out________

********************************************************************************
* Read the Assignment Carefully before starting the search.       *
* Observe what is on the screen.              *
* Please use any check-out materials to complete the assignment.*
* Select A) NETWORK Disks - Search Kerr Library CD Network  *
********************************************************************************
Select Social Sciences (PsycLit/SSI)
Select PsycLit 1987-1992
Select Journal articles
DO NOT CLEAR THE SEARCHES OR SCREEN ON THIS ASSIGNMENT

I. Truncation symbols
   1. Type in "learns or Learn or learnt"
      Type in "learn?"

   1.1 Use the Index command and retrieve the following phrases:
       problem-solve, problem-solver, problem-solvers, problem-solving
   1.2 Type in "Problem solv???
   1.3 Type in "problem-solv??"

   What are the differences between the phrases in 1.2 and 1.3?

   2. What happens when you type in "Vaccin*"?
      Display and view all citations
      After this use the Index command to look up this term.
      How many records found on each term from the root word "vaccin"?

   3. If you want to search for the terms
      "happy or happiness or happily", what would you do?
      Would you truncate the root word?
      What truncation symbol would you use?
      OR Would you look them up in the Index? Please explain.

II. Thesaurus command
   1. Use the Thesaurus command and look up the phrase
      "Life-Satisfaction"
      From the Term Details for Life-Satisfaction,
      what year was this term introduced? .....................
      what is the Broader Term(s)? ............................
      what are the Related term(s)? ..........................
   2. Select the phrase "Life-Satisfaction"
3. Display and view some citations found.
   In what field was the phrase "Life-satisfaction" found?

III. Select your own topic or choose from the following topics:
   *the causes of students dropping out of school
   *Effects of anxiety and stress on dreams

1. Write down your topic..............................
2. If you choose the topics above, select \textit{PsycLit database}
   2.1 If you choose to do your own topic, write down the
       \textit{SilverPlatter database(s)} you have selected...........

3. Select 10-20 citations from your searches on the topic that
   you have chosen

4. Select Download and Change Options to the following:
   Fields to Download: Citation, descriptors, abstract
   Record to Download: Record that you have marked
   Field Labels: Short labels
   Download searches: Say Yes
   Drive: Select drive A:
   Filename: Home7.doc

5. Save (download) these citations on the floppy disk provided,

Note: The citations should relate to the topic you have chosen as
much as possible.

   At the CD center 3.5 is B drive
   5.25 is A drive

   At Rm. 202 MCC: 3.5 is A drive
   At Kerr Lab : 3.5 is A drive

III. Please answer the following questions in your own words:

1. What is the "?" used for?

2. What is the "*" used for?

3. What does the Thesaurus command do?

Please remember to turn in the floppy disk with this assignment.
Self-Instruction Group Lesson Plan

From the second through the fifth weeks, the subjects used SilverPlatter user's guide (called SPIRS user's manual), Wilsondisc teaching guides and help guides from the CD center to complete assignments at their own pace. The assignments for this group were identical to those assigned the conventional instruction group.
The goal of this study is to learn to become familiar with Wilsondisc and SilverPlatter databases. You will be learning with the help of weekly assignments. You will complete the assignment at your convenience.

You will be given 2 assignments per week. There is no time limit for each assignment. Each assignment is designed to be completed in one hour, but if you wish to spend more time on it, I appreciate your time and effort.

The total length of the training is four weeks.

Please, Check-Out the following materials at the CD center:

* Compact Disk Database Selection Guide.
* Compact Disk - Subject Selection Guide.
* Wilsondisc Teaching Guide (In "NATTAYA CD DATABASE TRAINING BOX")
* CD User Guide: Wilsondisc and Wilsondisc Key Template

Please do not ask anyone to help you in the search strategy. You may ask for help in the use of function keys only. If you have questions regarding instructions, please contact Nattaya.

Each week you will be given two assignment sheets from Nattaya. After completing your assignments, please put them in the yellow envelope and leave it in NATTAYA CD DATABASE TRAINING BOX at the CD center.

Your effort in completing the study is very much appreciated. It will help educators in the understanding of learning and teaching at the college level for future education. In addition, the educators and CD-ROM vendors will learn more about the effectiveness of the user interface.

If you have any question, please contact Nattaya at one of the following:

I will be at CD center working on Wed 10:00am. - 1:00pm.
Thu 8:00am. - 10:00am.
Sat 7:00pm. - Midnight

Or you may leave me a message at the CD center any time.

Day time phone : 737-7279 leave a message with John Donel
Home phone : 757-0825 (early morning, early evening, or you may leave a message)

Thank you very much for participating in the study
Introduction

CD-ROM (Compact-Disc-Read-Only-Memory) means the information on the disc cannot be changed. The CD-ROM databases allow you to perform literature searches by typing keywords or subject terms into a computer. There are many CD-ROM vendors, or producers, such as Wilsondisc, SilverPlatter, Compact Cambridge, and UMI etc. Wilsondisc produces CD-ROM databases covering a variety of subjects such as:

Applied Science & Technology Index
Biological & Agricultural Index
Business Periodicals Index
Education Index
Essay & General Literature Index
General Science Index
Humanities Index
Social Sciences Index
APPENDIX D

CD-ROM DATABASES (WILSONDISC, SILVERPLATTER)
Wilsondisc databases were produced by H. W. Wilson company. The databases cover various subjects with resemblance to the print indexes which Oregon State University is subscribing. The Wilsondisc databases used in the study are the following:

- Applied Science and Technology Index
- Biological & Agricultural Index
- Business Periodical Index
- Education Index
- General Science Index
- Social Science Index

The databases have three search modes, a subject search (Browse), multi-subjects search (Wilsearch), and command search (Wilsonline) modes.

SilverPlatter databases were produced by SilverPlatter Information System. SilverPlatter contains various databases which uses the command menu interface. The databases used in the experiment were as follows:

- Agricola (Bibliography of Agriculture)
- CAB Abstracts (Commonwealth Agricultural Bureau)
- Medline (Index Medicus)
- PsyClit (Psychological Abstracts)

All databases used in the study are accessible via the Oregon State University campus network. Databases were
equipped with the online help screen and came with the print manuals.
APPENDIX E

SUBJECT EVALUATIONS
CD-ROM TRAINING EVALUATIONS
Conventional Instruction Group

Name..................................................

Please circle one (1,2,3, or 4) which apply to you.

1. How helpful do you think formal training of searching CD-ROM databases will be for your future research papers?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

2. How helpful do you think formal training of searching CD-ROM databases will be in saving you time in retrieving information from the compact-disc databases?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

3. Do you think formal training will improve the effectiveness of your information searches on CD databases?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

4. In your opinion, how necessary is formal training in searching CD-ROM database?
   1. Very necessary
   2. Somewhat necessary
   3. Unnecessary
   4. Not helpful
5. Do you prefer searching with Wilsondisc or SilverPlatter CD-ROM databases?
   1. Wilsondisc
   2. SilverPlatter
   3. Both Wilsondisc and SilverPlatter
   4. Neither

6. How often do you search CD-ROM databases besides class time or class assignments?
   1. Use only during class time
   2. one-two time per week
   3. three-five times per week
   4. More than five times per week

7. If you search CD-ROM databases on your own, what CD-ROM databases did you use?
   1. Wilsondisc
   2. SilverPlatter
   3. Both Wilsondisc and SilverPlatter
   4. Other, please specify...........................

8. If you had a choice, which instruction method would you prefer?
   1. Instruction
   2. Self-instruction (independent study)
   3. Other, please specify...........................

9. Do you think two times per week for four weeks is sufficient time for CD-ROM database training?
   1. Too long
   2. About right
   3. Too short
   4. Other, please specify...........................
10. Do you think the level of difficulty of the teaching method or teaching instruction was?
   1. Too difficult
   2. About right
   3. Too easy
   4. Other, please specify.........................

11. Other comments:
CD-ROM TRAINING EVALUATIONS
Self-Instruction Group

Name..........................................................

Please circle one (1, 2, 3, or 4) which apply to you:

1. How helpful do you think formal training of searching CD-ROM databases will be for your future research papers?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

2. How helpful do you think formal training of searching CD-ROM databases will be in saving you time in retrieving information from the compact-disc databases?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

3. Do you think formal training will improve the effectiveness of your information searches on CD databases?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

4. In your opinion, how necessary is formal training in searching CD-ROM database?
   1. Very necessary
   2. Somewhat necessary
   3. Unnecessary

5. Do you prefer searching with Wilsondisc or SilverPlatter CD-ROM databases?
   1. Wilsondisc
   2. SilverPlatter
   3. Both Wilsondisc and SilverPlatter
   4. Neither
6. How often do you search CD-ROM databases besides class time or class assignments?
   1. Use only during class time
   2. One-two time per week
   3. Three-five times per week
   4. More than five times per week

7. If you search CD-ROM databases on your own, what CD-ROM databases did you use?
   1. Wilsondisc
   2. SilverPlatter
   3. Both Wilsondisc and SilverPlatter
   4. Other, please specify..........................

8. If you had a choice, which instruction method would you prefer?
   1. Instruction
   2. Self-instruction (independent study)
   3. Other, please specify..........................

9. Do you think two times per week for four weeks is sufficient time for CD-ROM database training is?
   1. Too long
   2. About right
   3. Too short
   4. Other, please specify..........................

10. Do you use the paper manuals and help guides to help you in CD-ROM database searches?
    1. Yes, I use the paper manual and help guides.
    2. I sometime use the paper manual and help guides.
    3. No, I don’t use any of the paper manual or help guides.
    4. Other, please specify.........................

11. How do you use the paper manuals and help guides to help you in CD-ROM database searches?
    1. I read the manuals and help guides before doing assignments.
    2. I used the manuals only when I can’t figure something out.
    3. I don’t use the manuals.
12. How helpful are these paper manuals and help guides when performing CD-ROM database searches?
   1. Very helpful
   2. Somewhat helpful
   3. Not very helpful
   4. Not helpful

13. What kind of computer interfaces are you familiar with?
   1. IBM, Dos
   2. IBM, Windows
   3. MacIntosh
   4. Other, please specify

14. Do you think the level of difficulty of the instructions for the assignments was?
   1. Too difficult
   2. About right
   3. Too easy
   4. Other, please specify

15. Other comments:
APPENDIX F

TIME-LINE FOR THE STUDY
TIME-LINE FOR THE STUDY

First Week, Initial Meeting

All students read and sign the consent form, complete a demographic questionnaire, and take the CD-ROM Competency Test. Selected participants were randomized into either the conventional instruction group or the self-instruction group. Selected subjects placed in the conventional instruction group were contacted subsequently to schedule class sessions.

Subjects in the conventional instruction group were trained in the techniques to search the Wilsondisc and SilverPlatter databases for up to one hour, twice each week for four weeks. They were be given seven assignments to complete during a four-week period. The students in the self-instruction group were asked to review the paper manuals, which were produced by the CD-ROM vendors, and other In-House CD-ROM help guides provided in the Kerr Library at the CD center. They also were provided with a CD-ROM database listing containing explanations of the information within each database. They were given seven assignments identical to those assigned the conventional instruction group to complete during a four-week period. Subjects were allowed to ask for assistance from the researcher with computer function keys, to the exclusion of assistance with searching strategies. Subjects in the
self-instruction group were perform the database searches at their own pace.

All assignments were corrected by the researcher.

Weeks Two Through Five

Conventional Instruction Group Lesson Plan

Lesson 1
TOPIC: Introduction to CD-ROM Technology

Lesson 2
TOPIC: Wilsondisc three search modes.

Lesson 3
TOPIC: Search Strategies and Basic Search Operators in Wilsearch mode

Lesson 4
TOPIC: Operating Wilsonline Mode and NBR (or Neighbor command)

Lesson 5
TOPIC: Wilsondisc Truncations, Field Qualifiers and Download of Information onto a Floppy Diskette.

Lesson 6
TOPIC: Basic Searches in the SilverPlatter Databases
Lesson 7

TOPIC: Searching in SilverPlatter Using the Operators (WITH, NEAR, IN), Field Qualifiers, and the History Command.

Lesson 8

TOPIC: Operating Truncations, Thesaurus, and Downloading.

Self-Instruction Group Lesson Plan

From the second through the fifth weeks, the subjects used SilverPlatter user’s guide (called SPIR user’s manual), Wilsondisc teaching guides and help guides from the CD center to complete assignments at their own pace. The assignments for this group were identical to those assigned the conventional instruction group.

Sixth Week

All participants were administered a posttest using the CD-ROM database competency test, and were asked to complete a subject evaluation form.
APPENDIX G

MEAN SCORES
Training Method Mean Scores

Gender Mean Scores