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Electronic publishing and its impact on print publishing: A study of expenditure and usage in three selected libraries in Atlanta, Georgia

Wang, Chih, Ph.D.

University of Pittsburgh, 1988

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ELECTRONIC PUBLISHING AND ITS IMPACT ON PRINT PUBLISHING: A STUDY OF EXPENDITURE AND USAGE IN THREE SELECTED LIBRARIES IN ATLANTA, GEORGIA

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Submitted to the Faculty of the

School of Library and Information Science

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

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1988

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Without books,

history is silent, literature dumb, science crippled, thought and speculation at a standstill. Without books, the development of civilization would have been impossible. They are engines of change, windows on the world, and (as a poet said) 'lighthouses erected in the sea of time.' They are companions, teachers, magicians, bankers of the treasures of the mind. Books are humanity in print.

BARBARA TUCHMAN

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ABSTRACT

This work consists of seven chapters. It was designed as a case study in response to the claim made by Lancaster, Thompson, and others that electronic publishing will replace print publishing, and libraries will disappear by the year 2000. The objectives of the study were to review the literature on the subject, to collect data, to examine the possibility of the impact, and ultimately, to provide knowledge for practical purposes as well as for satisfying academic curiosity. Three libraries in Atlanta, Georgia were selected for the study. The expenditure for, and the usage of, the two forms of publishing in the selected libraries were examined.

For obtaining usage data, ten online databases with parallel publishing in print form were chosen from the Dialog Database Catalog. Three questionnaires were constructed. The administrator, reference librarian, and ten endusers in each selected library were surveyed. The collected data are arranged in 24 tables shown in Chapter Five. The correlation and variance analyses were used. For the former, the Pearson r was applied; for the latter, the ANOVA or t-test was employed. The SPSS-x was taken to do computing.

Various programs and analyses are appended. The results of these analyses are sorted into two tables in Chapter Six. Based on the literature review, the collected data, and the results of different analyses, the study does not support Lancaster and his associates' claim. Detailed discussion, conclusions, implications, and recommendations are summarized in Chapter Seven.

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ACKNOWLEDGEMENTS

Great appreciation is extended to Dr. Patrick R. Penland, Chairman of the Dissertation Committee, for all his support, efforts, and guidance in the design and completion of the research; to the Distinguished Professor Allen Kent, whose keen insight provided impetus to the study; and to the other members of the Dissertation Committee, Professor Romano Almagno, Dr. Michael B. Spring, and Professor Wendell L. Wray, for their suggestions and contributions to the project.

Special recognition is made to Dr. Lorene B. Brown, Dean, School of Library and Information Studies at Atlanta University, Dr. Stephen E. James and Dr. James Whitehead for their inspiration and encouragement, and to Dr. Conrad L. Mallett, President, Connecticut Capital Region Community College District, Dr. Harvey S. Irlen, Provost, Michael Moran, LRC Director, at Asnuntuck Community College for granting me a leave to draft the work. Gratitude is also given to Carolyn Clark for her reading of the draft; to Herbert F. Johnson, Casper L. Jordan, Anne Page Mosby, Elizabeth Patterson, Dr. Ralph E. Russell, and many others who participated in the study, for their time and efforts; and to all my colleagues and friends for their different forms of assistance.

Many thanks are given to my wife, Kwei, my son, Henry, and to other family members, for their understanding of the undertaking.

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Chapter One

INTRODUCTION

Alvin Toffler, a futurologist, pronounces at the beginning of Future Shock published in 1970 that "Western society for the past 300 years has been caught up in a fire storm of change." "This storm," he says, "far from abating, now appears to be gathering force." According to Toffler, the change "will be" especially obvious "in the three short decades between now and the twenty-first century," during which "millions of ... people will face an abrupt collision with the future."[1]

In another work, Toffler calls the stage of the change the first, second, and third wave.[2] Daniel Bell, Harvard sociologist, terms the third wave as the post-industrial society,[3] and John Naisbitt, also a futurologist, describes it as the information society.[4] These authors all talk about the social revolution from agricultural, to industrial, and post-industrial movements. In the new era, especially in "the three short decades," people have faced many "abrupt collisions."

Computer experts have developed programs, such as OLIVER (Online Interactive Vicarious Expediter and Responder), to help human beings deal with decision overload.[5] Authors of science-

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fiction have envisioned fantasies, such as a "mechanical educator," which "could impress on the brain, in a matter of a few minutes, knowledge and skills which might otherwise take a life time to acquire." And men are talking about further "human revolution," "the extension [or extinction] of the human intellect by electronics," and even "the obsolescence of man."[6]

In the third wave world, "info-spheres" and "electronic cottages" have sprung up, and people have huddled around computers.[7] In the post-industrial or information society, information workers in the United States have for the first time begun to outnumber production workers. Information or knowledge has become the primary industry, which supplies the economy with the essential and central resources of production.[8]

The changing environment and the new world have brought a great new opportunity, as well as a vital challenge, to the library and information profession. The innovations of electronic technology have helped and will continue to help the profession function. The enormous capability of technology to capture, store, manipulate, and transfer information can be applied to help the profession bridge huge social demands for information with tremendous recorded knowledge. The potential of technological innovations is virtually unlimited. The fact of this unlimited technological power has become a considerable concern of the profession. The issue is whether or not technological innovations will be so extended that they will eventually replace conventional printed media, and in turn, will make traditional libraries obsolete.

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The present study was undertaken to explore a segment of this impact issue. The work is arranged in seven chapters. The first is an introduction, which covers the research problem, objectives, significance, definition of terms , and scope of the study. Chapter Two and Three review related literature. Chapter Four formulates the framework of the study, including assumptions, research questions, hypotheses, and null hypotheses. Chapter Five and Six deal with data collection, analysis, and interpretation. The final chapter concludes the study with summary, discussion, conclusions, and recommendations.

Statement of the Problem

Frederick Wilfrid Lancaster, Professor of Library and Information Science at the University of Illinois, Urbana-Champaign, has devoted several works to the impact of technology on conventional printed media and traditional libraries. He has observed the exciting phenomenon in the changing society and the great capabilities and perspectives of new technologies. Based on his observations and the results of earlier studies, Lancaster predicts in one of his works that electronic publishing will replace print-on-paper publishing[9], and libraries will disappear by the year 2000.[10]

Many other authors disagree with Lancaster's forecast. For example, Dan Lacy, Senior Vice President at McGraw-Hill, Inc.,[11] Thomas J. Galvin, ALA Executive Director,[12] and Edward M. Walters, Director of the University of Texas Library,[13] all have expressed opinions, which are different from Lancaster's prediction. In reviewing Lancaster's work and other related literature, this writer

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concludes that traditional publishing will exist along with other communication media and libraries will survive in the foreseeable future.[14] The argument raises a problem: will electronic publishing replace traditional print-on-paper publishing by; and, in turn, will libraries survive to, the year 2000?

Objectives of the Study

1. The primary objective of the study was to present an overview of electronic publishing including its definition, taxonomy, history, issues, and different opinions on its likely impact on print publishing and libraries.

2. The study was specifically designed to survey and analyze the expenditure in three selected libraries in Atlanta, Georgia. Its objective was to examine the relationship between the expenditure for online services and that for print materials, and to examine the variations of the expenditure among the selected libraries.

3. It was, in the meantime, specifically devised to survey and analyze the usage of ten selected online databases and their print versions in an attempt to ascertain the relationship between the usage of the selected databases and that of their corresponding versions in print form, and to ascertain the variations in the usage among the selected online databases, between the full-text and the reference databases, and among different demographic variables of users in the selected libraries.

4. Along with the analysis of the expenditure and usage, the study attempted to survey and analyze users' satisfaction in order

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to investigate the variations of satisfaction among different user groups in the selected libraries.

5. In addition, the study was also conducted to collect enough descriptive data for the purpose of interpreting and understanding the activities related to the two forms of publishing.

6. Based on the above review, survey, and analyses, the study was intended to provide data regarding the possible impact of electronic publishing on the traditional print-on-paper publishing.

7. The ultimate objective of the study was to contribute to the overall knowledge of electronic publishing and its relationship to print publishing. Such knowledge should be useful for the library and information profession in projecting, planning, and developing educational curriculum, organizational structure, and information services for the future.

8. By necessity, the work was developed as exploratory research with the objective to gather baseline information that may provide a foundation for future studies in this area.

Significance of the Study

The literature related to electronic publishing has grown dramatically in the past decade. Many new titles of monographs and journals in the field have been published each year. And very importantly, the literature on the subject is mainly related to the library and information profession. The study is significant in that it selected, reviewed, and summarized the literature and presented this knowledge to the profession.

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The issue of the likely impact of electronic publishing on print publishing has been discussed for more than two decades. The discussion reported in the literature, however, has been direct statements, discrete facts, or personal views or opinions. No study has provided an answer substantiated by statistical evidence. The present study is important in that it analyzes different related variables and answers the research questions with statistical evidence.

The possible extinction of print publishing and of libraries is of considerable concern to the future of the library and information profession, the traditional publishing industry, and many other related social institutions. It is not justifiable simply to overlook the possibility, or to state that it will not happen in a certain time. This work explores this issue; the results can serve practical purposes for the library and information profession and other related social institutions as well as satisfy the academic curiosity of researchers on the subject.

Furthermore, the opinions of those for and against the issue of impact have been extensively expressed in the literature. There is, however, no statistically significant research on the issue. As exploratory work, this study may open a door leading to further research in the field.

Definition of Terms

Electronic Publishing has been defined variably by different authors. Carlos A. Cuadra,[15] Meredith Butler,[16] Hugh

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Evison Look,[17] May Katzen,[18] and many others have defined the term. Selected below are a few examples of the definition given by various authors:

The Office of Arts and Libraries' (OAL) Working Group, United Kingdom Department of Education and Sciences, defines electronic publishing as

> a form of publishing in which information is distributed using electronically encoded signals, stored for processing on computers or other means and displayed for viewing by users either on a screen or as print-out.[19]

David I. Raitt, Information Scientist in the European Space Agency provides a simple and clear definition for the term. He considers it "as the preparation, storage, and dissemination of information ... using computers, telecommunications and terminals...."[20-22]

Michael B. Spring, Professor of Information Science at the University of Pittsburgh, also has a concise definition for electronic publishing. He states that it is "the electronic dissemination of information" and that it encompasses "the processes of input, storage, manipulation, composition and display of information for presentation."[23] Oldrich L. Standera, Technical Director of the Electronic Publishing Project at the University of Calgary, considers electronic publishing as "an umbrella term for a wide variety of publishing endeavors...."[24] He further explains the publishing processes involved in electronic form:

> At the earliest, it may be put into electronic form at the moment when the ideas to be conveyed have been conceived, and it may remain in the electronic state all the way to the moment of delivery on the screen of a terminal or microcomputer as, for example, in an electronic journal stored in a computer, or as videotex pages

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> presented on a TV monitor. Alternatively, the final product may be delivered to the consumer (reader) as hard copy (for example, a printout of an on-line search in a computer stored database) or as a computer-generated microfilm of (sic) microfiche (COM), as a recorded voice, in braille, as a videodisc or diskette, and in still other forms. The distributed product need (sic) not be the end product; it could be a magnetic computer tape containing an issue of a journal for different uses by different people, either as a periodical issue of a database or as input into typesetting. And there are many ways to obtain a hard copy from the original electronic 'copy,' including an increased potential for on-demand and synoptic publishing.[25]

In the present work, electronic publishing was represented by online services and ten selected online databases, which are described in Chapter Five.

An Enduser is, according to Robert E. Buntrock and Aldona K. Valicenti of Amoco Corporation's Research Center, "the eventual recipient of information, namely the customer, client, the expert (or the would-be expert) or decision maker...." According to them, "enduser searching appeared on the scene shortly after the beginning of readily available online searching in general, which ... is July, 1973."[26] While many authors treat the term as two words with or without hyphen, others have begun to use it as a one-word term,[27] particularly in recent publications. The latter form is adopted in the present study except in quotation, where the author's spelling is retained. A total of thirty endusers in the three selected libraries were taken for the present research.

Expenditure is defined as the act or process of spending, or as something that is spent.[28] In this study, it specifically refers to the direct costs spent for online systems and print pub-

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lications in the selected libraries during the chosen years. Indirect costs on personnel, housing, utilities, etc. were not taken for measurement.

A Full-Text Database contains the entire text of documents such as wire service stories, legal cases, encyclopedia articles, journals or textbooks, as explained by Carol Tenopir, Professor of Library Science at the University of Hawaii.[29] According to Martha E. Williams, Professor of Information Science at the University of Illinois, Urbana-Champaign, LEXIS is one of the first full-text databases, created in the 1960's.[30] In the present study, four full-text databases were included.

Online Databases. Look in a book he edited defines online as the "mode of operation in which terminals, or other equipment, are controlled by a central processor."[31] Susan Wiedenbeck at the University of Pittsburgh's School of Library and Information Science offers that a database consists of

> a collection of files that are integrated to reduce redundancy, provide for data independence, provide security, provide data integrity and reliability, and permit new relationships to be defined as required.[32]

Online databases, therefore, consist of different collections of data files which are processed, stored, and controlled in central locations, and are retrieved through computer terminals, communications lines and other equipment as required. In one of her works, Williams also calls them electronic databases.[33] In this study, the term online is adopted as one word if it is not quoted otherwise. Ten online databases were selected from the Dialog Database

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Catalog[34] for the present study.

Online Systems, according to Williams, which are "called information utilities or database vendors, provide online databases together with software for search and retrieval, data manipulation and modeling."[35] BRS and Dialog, for example, are two popular on-line systems or vendors. Online public catalogs and stand alone or other in-house information systems were excluded from the present study.

Print Publishing refers to conventional print-on-paper publishing. Generally, it involves the processes of etchings, engravings, mezzotints, etc.[36] In this study, it was represented by paper-based books, journals, newspapers and other print materials traditionally held in libraries. Films, microforms, and other audiovisual materials were excluded in the study.

Reference Databases point "the user to something else: a document, a named person, a project, and so forth," as defined by Cuadra.[37] They may be directories, bibliographic guides, or information sources. In the present work, six reference databases were selected. More description of the term is referred to in the categorization section in Chapter Two.

Usage is defined by the Webster's Third New International Dictionary as the action, amount, or mode of using.[38] There are different ways of measuring database usage. Online systems may be measured by connect hours, number of passwords issued, revenues generated, number of searches, etc. In print products, the usage may be measured by the number of times an item is circulated or

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accessed. In this study, usage referred to the amount of use of the selected databases; i.e., the number of access times to these online and print publications.

Scope of the study

As indicated above, electronic publishing has a wide variety of activities and formats. Also discussed later in Chapter Three, the impact of electronic publishing on print publishing involves technological, economic, marketing, and many other considerations. The issue is vast and complicated.

The present work was conducted as a case study. It employed the survey method to collect representative data needed for the study. The work was also designed as exploratory research because of necessity. It is a multifaceted work which explores several limited aspects of a complicated issue. The result of the study weighs heavily, although with limited power, one side of a broad and generalized issue. In respect to the future of libraries, this study can provide direct reassurance about the association of libraries with print-on-paper products, and indirect reassurance about the association of libraries with so many machine-assisted functions. Detailed scope of the study is delineated in the subject selection section of Chapter Five.

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Chapter Two

SIGNIFICANT LANDMARKS, CATEGORIZATION, AND ISSUES OF ELECTRONIC PUBLISHING

As stated, an overall review of literature related to electronic publishing is the first objective of the study. As indicated, the subject covers a wide range of literature. It is due to this fact that the present study has allocated two chapters to deal with the literature review. One summarizes the general aspect of the literature; the other reviews the issue of impact discussed in the literature.

This chapter deals with four major areas pertaining to electronic publishing: significant landmarks, categorization, advantages and disadvantages, and issues and concerns. The landmarks are the historical development of electronic publishing. Many important ideas, visions, and actual experiments are covered.

Significant Landmarks

It is known that paper and printing were originated in China in the second and fifth century of the Christian era respectively,[1] since the inventions are recorded on print-on-paper publications. It may not be recognized in the Western world that

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there is a "wordless heaven-book" (無字天書) in China because it is a legend "published" in paperless or oral form among the Chinese. The heaven book is actually an adaptation and extension of "The Song of Baked Dough by Pei-Wen Lu" (劉伯溫燒餅歌)[2] of the fourteenth century. The "elite" in every generation has access to the timelessly flexible text of the wordless book, to interpret the contents, and to predict accordingly the great events of the world, literarally, of the "Middle Kingdom," which is China in Chinese, particularly when the world is in chaos. Although the work is fictional in a sense, the wordless heaven-book can be considered broadly as the pioneer prototype of modern electronic publishing and as the earliest idea of the recently developed hypertext.

Another classic concept of electronic publishing can be traced in Gulliver's Travels by Jonathan Swift. First published in 1726, the work has a passage describing a writing machine developed by the Lagadonians in the Grand Academy of Lagado. "The superficies was composed of several bits of wood, about a bigness of a dye.... They were all linked together by slender wires." By this contrivance, "the most ignorant person at a reasonable charge ... may write books in philosophy, poetry, politics, law, mathematics and theology, without the least assistance from genius or study." The Lagadonian writing machine used the method of a fixed syntactic structure and the filling in of that structure with contents by a random procedure.[3]

Recently, Edwin B. Brownrigg and Clifford A. Lynch of the Division of Library Automation, University of California, Berkeley, declare also in a broad sense that "electronic publishing was

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established ... in East Pittsburgh in 1919 - 1920 with Frank Conrad's music broadcasts at radio station KDKA...."[4] Joseph Becker, President of Becker and Hayes, claims that, in 1944, he applied punched card machines to a file of information about enemy ordinance. He used the punched cards to code indexed information and to store bibliographic citations and abstracts.[5]

In 1945, Vannevar Bush, then Director of the U. S. Office of Scientific Research and Development, envisioned a machine he called "memex." It "is a device in which an individual stores his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility." He further described that:

> It consists of a desk.... On the top are slanting transluscent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers....

He continued that "encyclopedias [are] ready to be dropped into the memex and there amplified."[6] Later, Bush and Ralph Shaw, then the librarian of the U. S. Department of Agriculture, built the Bush-Shaw rapid selector, a database of the abstracts of the Bibliography of Agriculture.[7]

In the 1950's, James W. Perry, Allen Kent, and Jesse H. Shera at Western Reserve University invented a machine for information searching using relays as switches and punched paper tape as the medium for storing abstracts, index terms, and search requests. The machine was able to search an abstract a minute and handle ten questions simultaneously. It is considered the forerunner of today's high speed text array processors. At about the same time, Fred

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Jonker built the Termatrex, a machine to facilitate the process of coordinated indexing founded by Mortimer Taube.[8]

In the Fall, 1960, Theodor Holm Nelson, then a graduate student at Harvard University, announced as his term project a writing system for the 7090 computer. The idea of the project was to store "manuscripts in the computer, change them with various editorial operations, and print them out." He called the process "text handling," and named it Project Xanadu. A prototype of the system was developed and put online for experimentation in January, 1987.

Nelson claims that Project Xanadu "is the first hypertext system to be so called," although he recognizes that actually the first hypertext is the NLS system created at Stanford Research Institute by Douglas Engelbart, the inventor of electronic text systems. Later, Nelson broadened his concept of hypertext and coined the term "hypermedia." The idea of "hypertext" is essentially "non-sequential writing -- text that branches and allows choices to the reader, best read at an interactive screen."[9]

In 1965, Joseph Carl Robnett Licklider, Supervisory Engineering Psychologist of Bolt, Beranek, and Newman Inc. of Cambridge, Massachusetts, conceptualized "separating the information in books from the pages." He demanded that:

> We need to substitute for the book a device that will make it easy to transmit information without transporting material, and that will not only present information to people but also process it for them.... To provide those services, a meld of library and computer is evidently required.[10]

It was in the 1960's that System Development Corporation (SDC) de-

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monstrated the first online bibliographic text search system,[11] and the Mead Data Central (MDC) developed LEXIS, one of the first full-text databases.[12] Also in the 1960's, computers were first used to drive photocomposition devices in the print process. This primitive electronic publishing generated machine-readable databases, which, in turn, were used for computerized literature search.

In the 1970's, computers, telecommunications, televisions, and software were further developed and converged. Now, technologies were ready for the complete process of electronic publishing. With this background, the New Jersey Institute of Technology launched the Electronic Information Exchange System (EIES) in 1976. The EIES provided its participants with the capabilities of personal communicating, group conferencing, document publishing, word processing, text editing, etc.[13]

By means of the EIES, the entire publishing process was facilitated. Writing, revising, transferring, reviewing, editing, publishing, and reading were done through the electronic communication system. There were four prototypes of electronic journals for experimentation: newsletter, paper fair, mental workload, and legitech.[14] Richard M. Dougherty and Wendy P. Lougee at University of Michigan Libraries consider the EIES as relatively successful in comparison with other systems, such as ADONIS (Article Delivery Over Network Information Service) project, which was scaled down from its original conceptualization.[15]

In 1980, the University of Birmingham and Loughborough University of Technology in the United Kingdom jointly announced the Birmingham and Loughborough Electronic Network Development (BLEND)

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project. The aims of the project were to study the problems of setting up an information community and to establish an electronic journal. The concept of the electronic journal was described as:

> Using a computer to aid the normal procedures whereby an article is written, referred, accepted, and published.... The editor, referees, and alternately the readers, as well as the author, can have access to the text at their computers.[16]

The BLEND experiment was completed in 1984. During the four-year experiment, it received over forty papers; published two issues of Computer Human Factors (CHF), a topical journal in the system; and entered twenty-one unrefereed papers in the "poster paper" section. It was reported that the system experienced many technological, "organizational, bureaucratic, social or psychological problems." It was also reported that the Loughborough Information Network Community (LINC), which was established to study various types of journals and to produce CHF on the system, was abandoned.[17,18]

In the mid 1980's, a wide variety of electronic publishing and networks mushroomed due to the emerging capability and availability of personal computers, artificial intelligence, software packages, etc. The various forms of electronic publishing include the continuous experiment of electronic journals, desktop publishing,[19,20] video magazines,[21] disk magazines,[22-24] etc. The electronic networks were primarily demonstrated in electronic or wired universities and libraries.

In 1983, David S Backer, Director of Video Disc Research at Mirror System, Inc., presented the Movie Manual. It is a proto-

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type electronic book orignated from his doctoral thesis for the Massachusetts Institute of Technology. It is patterned after the traditional book but is read on a touch-sensitive television screen. It employs the videodisc as the publication surrogate. It has the features provided by a traditional book, including text structure, letter-type variety, even edge-marking. It also has the merits of containing audio and visual tracks and its video pages are dynamically "type set."[25]

Also in 1983, Robert J. Spinrad, Director of Systems Technology at the Xerox Palo Alto Research Center, published his article, "The Electronic University." In his vision, all activities of faculty, students, and administrators at the wired university can communicate with each other via electronic means.[26] In the same year, Ronald E. Rice, Visiting Professor at the Annenberg School of Communications, University of Southern California, and his coauthor presented the use and utility of electronic message systems at a west coast university.[27]

Again in 1983, Brown University began the Scholar's Workstation Project, according to a report by Barbara B. Moran, Professor at the University of North Carolina's School of Library Science, and her coauthors. The goal of Brown's project "was to experiment with, shape, and evaluate new types of computer and communication tools that might have a profound effect on future education and scholarship." Brown University originally envisioned that by 1987, the project would have 10,000 workstations including those located in faculty homes.

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According to the report, Brown University was "wired," installed with a campus network of over 3,200 personal computers. The wiring, however, went only to "the outside of the building," and the Scholar's Workstations were not yet operational in Fall, 1985. Furthermore, there were obstacles to the implementation of the project, such as opposition from faculty.[28]

In the following year, Learned Information, Ltd. launched The Electronic Magazine, an all-electronic database. News items from Europe and United States are assembled in microcomputers and transferred by telecommunications to Oxford, where they are processed and merged with other news items received from other locations. After processing, these news pieces are uploaded onto disks in Rome, which then contain the magazine ready for online reviewing. The magazine is comprised of news, announcements, short articles, book reviews, advertisements, and so forth.[29]

Learned Information's primary aims in introducing the electronic magazine were to create a viable online database that would complement existing paper sources, and to create a working and efficient shell system into which additional databases could be plugged. The online file was reportedly working well on the host system. However, it was disappointing that during the first year, only about one fifth of its searchers were regular users; others were all casual users. It was also found that its online software packages had compatibility problems with those of many other online vendors. This fact would certainly hinder it from reaching a broader market.[30]

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In 1985, Warner Books published The Policeman's Beard Is Half Constructed,[31] a book generated by the program Racter. This is considered to be the first book written by a computer. When Meredith Merritt discusses how to catalog the book, her suggestion is to take Racter, the computer program, as the main author, with William Chamblain and Thomas Etter, the creators of Racter, as the coauthors.[32]

Carlo Vernimb of the Commission of the European Communities (CEC) announced that APOLLO (Article Procurement with Online Local Ordering) services were likely to start in 1986.[33] Later, David I. Raitt said the services were "expected to get under way in 1987." The APOLLO project was sponsored by the CEC and, according to Raitt, was intended as a system for the electronic delivery of full-text documents from document centers to remote users such as local libraries. In the early stage, the project was expected to have the combined resources of the British Lending Library Division, Europe Data and Fachinformationszentrum Karlsruhe.[34]

Frederick G. Kilgour, OCLC (Online Computer Library Center) Founder Trustee, expected that a pilot model of EIDOS (Electronic Information Delivery Online System) would be available in 1988. Kilgour claimed that he envisioned the system in 1983 and OCLC, Inc. developed it later. The system "was designed to enable libraries to move out beyond bibliography by furnishing users directly with information."

He further illustrated the system and said that operating electronically, EIDOS would supply comprehensive data, information,

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and knowledge to information seekers of all sorts. Sources of information, in electronic form, would be comprised of books, journal articles, numeric databases, maps and charts. The EIDOS' major goal was to provide immediate availability of information in electronic form to every user at any time.[35,36]

In recent years, optical publishing has been growing fast. David C. Miller, Managing Partner of the DCM Associates, describes many formats of optical publishing, such as videodisc, compact audio discs, compact discs with read only memory (CD-ROM), and optical digital discs, tapes, and cards.[37] They are optical because they are optically sensitive materials to store information. They may use lasers for recording and reading. They are great media with enormous storage capacity; for example, a simple 4.72 inch CD-ROM disc stores 550 megabytes of data, that is equal to the data contained in 250,000 print pages, or equal to those in an entire encyclopedia set.[38] Lois F. Lunin,[39] Judith Paris Roth,[40] and many others have published different works to introduce the technology and basic understanding of optical publishing particularly in the CD-ROM area.

Optical publishing products have been applied to business,[41] education,[42] law, medicine, science and engineering,[43] etc. for research, training, and decision-making. Libraries have also widely applied the new products to their operations. Le Pac (Local Public Access Catalog) from the Brodart Company and Bibliofile from The Library Corporation are two major CD-ROMs applied by many library systems.[44,45]

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In the meantime, many indexes and databases previously available in print or online have also been published in CD-ROM format. Titles of these CD-ROMs cover almost every subject field.[46,47] The Grolier's Academic American Encyclopedia,[48] Information Access Company's InfoTrac,[49] NewsBank, and Wilsondisc are a few popular examples of these products.

Categorization

As defined in Chapter One, electronic publishing is an umbrella term for a wide variety of publishing endeavors. It may mean different things to different people. This section attempts to group it by various categorical methods. The purpose of the categorization is to clear up any misunderstanding of the terminology.

1. Newtonian and Quantum-Mechanical Method. On the basis of delivery method, Brownrigg and Lynch, in their work cited earlier, distinguish electronic publishing from print-on-paper publishing. They state that "hard copy publishing is 'Newtonian,' and electronic publishing is 'quantum-mechanical.'" The former is sent via rocket; the latter, through radio wave from one station to another without the storage medium.[50] In this sense, magnetic discs, tapes, CD-ROMs, etc. are still 'Newtonian' delivered publishing even though they are in electronic form.

2. Centralized and Decentralized Systems. With regard to electronic publishing, The Office of Arts and Libraries' (OAL) Working Group, United Kingdom Department of Education and Sciences, divides it by the location where information is stored and retrieved.

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By this method, it has centralized, decentralized, and hybrid systems. The centralized system requires users to search for information from national or international stores. The decentralized system delivers its information in packages to local libraries or information centers for processing and retrieval. The hybrid system contains elements of the two systems.[51] Accordingly, BRS, Dialog, and other online information utilities are centralized systems. Many CD-ROM information products are decentralized systems. And the Grolier's Academic American Encyclopedia available both online and in CD-ROM format is a hybrid system.

3. Parallel and Full Electronic Publishing. OAL's Working Group also sorts electronic publishing by the availability of print-on-paper material along with its electronic version. Where information is published in both print and electronic forms, the process is called parallel publishing. Where information is published only in electronic form, it is full electronic publishing.[52]

Mary Ellen Sievert at the University of Missouri's School of Library and Information Science adds a third group, "electronic typesetting with a paper copy resulting."[53] It is basically a process of computer-aided publishing, an earlier stage of electronic publishing. Today, many information products are still in parallel publishing, such as Bowker's Books in Print, which is available online, in CD-ROM, as well as in print. Relatively few of these products are in full electronic publishing. The Inspec's Electronic Materials Information Services[54] is one example of full electronic publishing.

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4. Reference and Source Databases. Judith Wanger and Ruth N. Landau at Cuadra Associates, Inc. identify two major categories of electronically published databases. One is reference databases referring users to a primary document for full information. These products include bibliographic and referral databases. The other is source databases. These products are comprised of numeric, textual-numeric, properties, and full-text databases.[55] Other authors also call these two categories secondary (abstracting and indexing) and primary or full-text services respectively.[56-58] Dissertation Abstracts Online is a reference or secondary publication; and Harvard Business Review, a source, primary, or full-text product.

5. By the Types of Technologies. Raitt classifies electronic publishing into teletext, videotex, online databases, file transfer, computerized typesetting, etc. Teletext is a narrowband service whereby information is broadcast over television signal to users' TV set. It is a one-way operation, not interactive, and used mainly to provide captioning for the deaf.

Videotex is a narrowband interactive service linking terminals or television sets and computers via telephone lines. Earlier, it was called Viewdata. Dow Jones News, CompuService, and The Source are in this family of service. File transfer is a digital facsimile transmission of paper copies over telephone lines.[59,60] Online databases and computerized typesetting have been described earlier.

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Advantages and Disadvantages

1. Advantages. In comparison with print publishing, electronic publishing has many advantages to users and scholars. John Senders,[61] Donald W. King,[62] Seldon W. Terrant,[63] Gordon B. Neavill,[64] and Larry Auld[65] all have recognized the benefits of electronic publishing. In line with these authors, Lauren H. Seiler and Joseph Raben, professors at Queens College expect that if electronic publishing is totally realized, users will not need to go to the library building for their needed information. They can obtain library materials via information networks in their offices, laboratories, homes, or other convenient locations.

The authors envision that a total electronic library will offer the greatest flexibility in retrieving information and the convenience to manipulate it. When information is stored in the electronic medium, the size of the characters and contents of information can be changed and improved whenever needed. According to their visions, users can select and retrieve electronically published articles in a few seconds or less; and the same articles can be available simultaneously to virtually limitless number of patrons.[66]

In reporting the concept of The Electonic Magazine, Harry R. Collier of Learned Information, Inc. acknowledges that electronic delivery is faster than print delivered by mail. He states that online databases will be easier to search than print products, and the buyer can get the exact information and pay for it on a per-item basis. He further says that electronic delivery can give a far greater flexibility in regard to subsequent storage options.[67]

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Nicole Yankelovich, and his coauthors at Brown University recognize that electronic document systems can create webs of information to link scholars and others. They note that electronic books allow flexible organization of materials. These books can provide authors and readers with a greater degree of freedom than printed books. They allow readers to travel easily from document to document.

According to them, the greatest advantage of electronic documents is their ability to handle many more graphic elements than paper documents can. In addition to static images, electronic books can provide dynamics, interactivity, and sound. The electronic medium can also aid dramatically in the updating and dissemination of information.[68]

In describing optical media, Richard A. Bowers, Director of Development for the Applied Information Technologies Research Centers, emphasizes the advantages of the new products. He says that in addition to the portability and other features of print, "the revolutionary benefit" of optical media is their ability to capture and access large volumes of data. When information is captured and mastered on an optical disk, neither the keepers nor the users will need to be concerned with missing issues or torn pages. Optical publishing may provide a means to store many smaller and highly specialized publications and to save them from extinction. Moreover, publications in optical medium can be accessed through random as well as through linear methods. For educational applications, complex material can be presented, in the same medium, textually,

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graphically, and verbally.[69]

2. Disadvantages. Many of the above and other authors, such as Herman A. Maurer, et al,[70] Harry R. Collier,[71] and Nicole Yankelovich, et al.,[72] also express their reservations while they praise the many merits of the new technologies. Along with these authors, Dougherty and Lougee, cited earlier, point out that "there is an obvious discomfort with the physical 'mechanics' of using computer terminals." They maintain that a computer screen can only display a limited amount of information at a time and the physical manipulability of documents cannot be easily recreated on a screen.[73]

Bill Katz, Professor of Library Science at the State University of New York, Albany, remarks that "the electronic magazine is both a dream and a nightmare." He enumerates four major reasons for despair of the new product. First, one cannot curl up with a computer. Second, computers have a habit of breaking down. Third, computer screens hurt eyes. And fourth, computers require various directions to locate a message.[74]

Following his comments on the merits of optical publishing mentioned above, Bowers also explains several "significant stumbling blocks" of the new technology. They are, among others, the limited availability of tools required for the technological wonders and the space requirement for workstations.[75] Barbara Quint, Editor of Database Searcher, counts her many disappointments with CD-ROMs. One of her laments is that "disc drives running other versions of compact disc optional storage would not run CD-ROM discs...."[76]

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Issues and Concerns

Many issues and concerns related to electronic publishing have been discussed in the literature by many different authors. Jerry Borrell,[77] Karl W. Brimmer,[78] David Peyton,[79] Richard M. Neustadt,[80] Neustadt, et al.,[81] Ithiel de Sola Pool,[82] Frances M. McDonald,[83] and many others have all written on the topic. This section highlights three major issues: 1. Federal government regulations and policies. 2. Survival of information. And 3. On-line service fees. This section summarizes the issues and concerns published in the literature with no intent to argue for or against any position.

1. Federal Government Regulations and Policies.

The issues discussed in this area are mostly concerned with accessibility, or freedom, of information, and with intellectual property. In respect to accessibility of information, the American Library Association (ALA) Commission on Freedom and Equality of Access to Information points out five possible barriers which may affect freedom of access to the new media. The barriers are government control or censorship, computer technology, monopoly of information industries, individual ignorance of information sources, and the cost of information.

The Commission is concerned with the issue of whether the electronic transmission of data and texts should be governed by the regulatory requirements of the Federal Communications Act or have untrammeled First Amendment freedom of print protection. It worries that the recent government deregulatory movement will permit the

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foreclosure of minority views from the air because of the nullification of the fairness and equal-time provisions of broadcast regulations and the elimination of must-carry and public access and leased-channel requirements. It also fears that "the already painful gap between 'information haves' and 'information have-nots' will be gravely widened." The reason for the fear is that the already less privileged will become less able to pay for, will have less computer skills to acquire, and will remain less aware of the availability of, needed information.[84]

At the Federal Library and Information Center Committee's Third Annual Forum in 1986, the speakers were also concerned with freedom of access to information. Focusing on Circular A-130 issued by the Office of Management and Budget (OMB) in 1985, they criticized user fees for information, and questioned the issues of private sector competition and access to information. Harold C. Relyea, Congressional Research Service Specialist warned that "freedom of information might be sacrificed in the holy cause of efficiency, economy, and budget balance." Thomas Giammo, Associate Director of the General Accounting Office's Information Management and Technology Division, remarked on the contract-out files in the Patent and Trademark Office that the PTO's switch to electronic files

> was a 'monster' that denied meaningful electronic information to the public while giving selected companies that computerized the files a virtual monopoly to market the information.[85]

Patricia Schuman, President of Neal-Schuman Publishers, notes that in making information policy, the frustration is "whether government information should be treated as an economic commodity to

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be sold for profit or as a public good available to all citizens."[86] Carolyn M. Gray, Assistant Director of Libraries at Brandeis University, echoes Schuman's viewpoint that "one of the issues of policy formation is the traditional economic conflict between equity and efficiency," and "between the private interests and the public welfare."[87] For these two different positions, ALA, the Association of Research Libraries (ARL) and other organizations support the position that the public should have equitable open access to government information. However, Information Industry Association, the Association of American Publishers, and other industry groups are in favor of the private sector's development and dissemination of government information.[88]

The ARL Task Force on Government Information in Electronic Format calls attention to the fact that "electronic government information has not yet been distributed to depository libraries...." The Task Force stresses that recent federal policies of privatization of government functions, reduction of government agency budgets, and over-zealous protection of government information will affect public availability of government information. It states:

> the full potential of technology is tempered by constrained budgets, controversy about the extent to which the government should spend tax dollars to actively disseminate information, and about the possibility that portions of the population could be left unserved if information is available exclusively in electronic formats. For example, vital data, such as detailed Census findings, are increasingly only available on computer tapes. This means these data cannot be used without certain skills and equipment.... At the same time that computer technology improves access for some people, access for others is more restricted.[89]

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The issues pertaining to intellectual property involve authorship and copyright. There is no problem of authorship for the wordless heaven-book mentioned above since it has been recognized as a part of Pei-Wen Lu's work. However, who should be designated as the author for volumes created at the Grand Academy of Lagado described in the aforementioned Swift's work:[90] the wired wood engine, the young students employed in using the machine, or the professor, the inventor of the machine? In the real world, although, as discussed earlier, Merritt considers the program, Racter, to be the main author of Warner's computer-generated book,[91] will Merritt's suggestion be acceptable? If so, the second edition of The Anglo-American Cataloguing Rules (AACR2)[92] will need to be revised to include computers and computer software as other entities of authorship. According to the OCLC records, it appears that the Library of Congress has not accepted Racter as an author.

In connection with the issue of copyright, the Center for Technology and Administration of the American University sponsored a symposium on automated information systems and copyright law in 1967, and produced several papers dealing with copyright issues and the emerging technology.[93] Generally, a work that is fixed in a tangible medium of expression is protected by the federal copyright law. Based on this, when the law protects the rights of print publishing, it also protects those of electronic publishing. The problem with electronic publishing, nevertheless, is that the infringement of copyright law is not easy to detect. Pool raises the issue in one of his publications, stating "in electronic publishing, copying does

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not require print. One needs simply provide computer access. One prints to read, not to copy."[94]

Ben H. Weil, Consultant of Technical Information Center, and Barbara F. Polansky, Copyright Administrator of the American Chemical Society, mention in their 1986 article that although database information is protected by copyright law and contract limitations, ease of use has put a strain on both copyright and contract protection. They further remark that online users can easily download extensive portions of data from databases for free use without detection by suppliers.[95]

2. Survival of Information.

In his work cited above, Neavill reminds us of the fact that traditionally libraries have taken the role of preserving recorded knowledge. He questions whether or not information will survive in an electronic society, which relies primarily on commercial systems for storage of information. He says that commercial electronic systems are only concerned with the distribution of information in the market-place. They will purge little or no longer demanded scientific or scholarly works. In addition, commercial information systems, like many other enterprises, have risks of bankruptcy; and information stored in electronic means is vulnerable.[96]

In a work cited above, Hills also worries about the possibility of losing data when a commercial firm goes out of business. In addition, she points out the fact that there is no agency attempting to catalog and classify the machine-readable information. She also makes a detailed list of archival issues and asks what kind of

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data should be kept, what will be an edition, etc.[97]

3. Online Service Fees.

To charge or not to charge users for access to online services is an extended issue of accessibility and freedom of information discussed above. Sheila S. Intner, Professor of Library Science at Simmons College, and Jorge R. Schement, Professor of Library Science at Rutgers University, report that confrontations between fee and free services were touched off when Wisconsin initiated charges for computer searching in public and academic libraries in 1984. In this case, one group of librarians said, "if we don't charge for the service, we can't afford to provide it." Another group countered that "if you charge for online information service, then the people who need it most and who rely on their libraries to obtain it will be cut off from access."

Intner and Schement continue by stating that the action of OCLC's copyright of its Online Union Catalog added more fuel to the confrontations. Wisconsin's libraries were divided into those that have OCLC and those that do not. The "haves" were forbidden by OCLC's copyright to share data with the "have-nots." Wisconsin's Council on Library and Network Development, however, maintained that "public supported agencies and libraries ... have a responsibility to make available to other agencies and to the public the information created by their staff."[98]

Margaret F. Stieg, Professor of Library Science at the University of Alabama, University, remarks that the real issue of fee or free online services is that of paying for information. From a

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historical perspective, she notes that the fundamental issue of fee vs. free is whether or not the library is a public good. Supporters of free services stand on the ground that public libraries serve political, social, economic, and cultural purposes. Those who favor fees echo the position of the social Darwinists maintaining that "it is inappropriate to subsidize some individuals at the expense of others."[99]

In reviewing the arguments for and against charging a fee for online reference searches, Dean Burgess, Director of the Portsmouth Public Library, compiles a checklist of reasons for charging fees. He then cites the 1977 ALA Resolution that "charging of fees and levies for information services, including those services using the latest information technology, is discriminatory in public supported libraries...." He further quotes pros and cons on the issues of discrimination and financial questions. In conclusion, the author's position is that "the library services must be free," and that "there is a clear benefit to our nation in free service and a clear tradition and a moral imperative for us to supply it."[100]

As a tradition, it seems that the library community opposes to charge fees for services. Graceanne A. DeCandido reports that ALA, the Medical Library Association, and the Special Libraries Association are among the organizations protesting the Federal Communications Commission's proposed access charges to enhanced service providers.[101] In reality, Mary Jo Lynch, Director of ALA Office for Research, concludes in a survey that "over 70 % of responding libraries charge fees.... Almost all university libraries charge fees...."[102]

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Moreover, evidence indeed indicates that a discrepancy on the fee issue exists within ALA itself. In spite of the fact that ALA, in principle, supports freedom of access to information, in actuality, its Reference and Adult Services Division has sponsored a conference and published a book entitled Dollars and Sense.[103] Both the conference and the book are practically intended to devise ways and means and to advocate how to charge users for online services. John Berry, Editor-in-Chief of Library Journal, reveals in a recent editorial that the ALA's Planning Committee has proclaimed a new attitude: "fees are not a barrier to library access and service." In Berry's opinion, ALA is yielding the principles of librarianship to current practices.[104]

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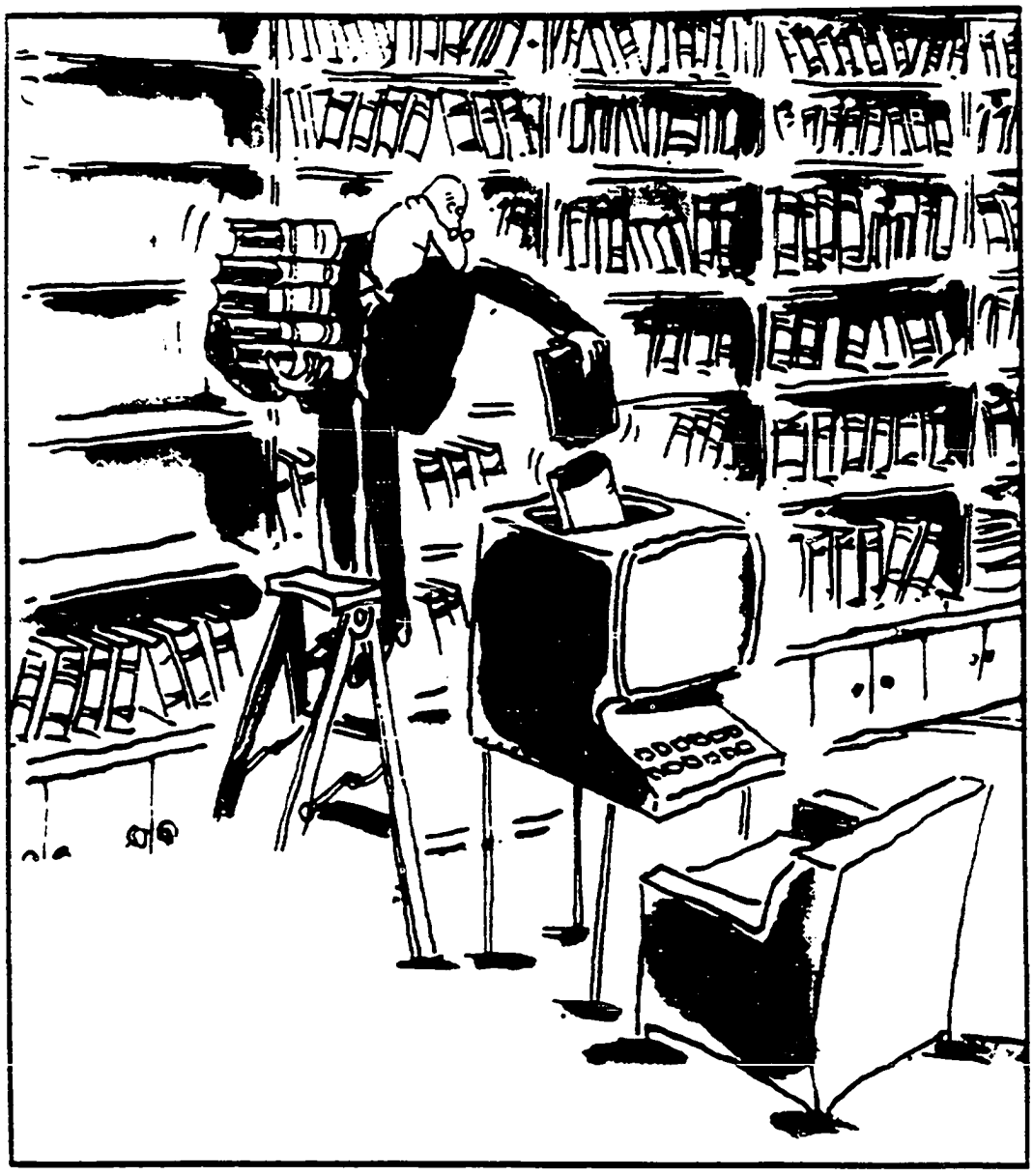

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Chapter Three

POSSIBLE IMPACT OF ELECTRONIC PUBLISHING ON PRINT PUBLISHING

The second chapter of the literature review deals with the impact of electronic publishing on print publishing. For purposes of simplification, the chapter divides the issue into two opposite positions and names them as replacement and coexistence theories. The former believes that electronic publishing will replace print publishing. The latter holds that electronic publishing will not replace, but will coexist with, print publishing as well as with other communication media. The review follows these two divisions accordingly. In addition, a brief comment on the two sides of the argument is made at the end of the review.

Replacement Theory

The demise of print-on-paper publishing and the disembodiment of libraries have been the concern of several authors since the 1960's. The forerunners of replacement theory include Bolt, Beranek, and Newman, Inc.,[1] Carl F. J. Overhage and R. Joyce Harmon,[2] Carlos A. Cuadra,[3] David Scarfe,[4] Lee G. Burchinal,[5] Margaret

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Saunderson,[6] and others. Frederick Wilfrid Lancaster along with his associates began a serious campaign for his belief in the likely replacement by electronic publishing of print-on-paper publishing and displacement of libraries with computer terminals in 1978, when he published a book entitled Toward Paperless Information Systems and an article, "Whither Libraries? or, Wither Libraries."

The book is based on the paperless system conceptualized by the Central Intelligence Agency (CIA) in the mid-1970's. The system was designed for CIA analysts to store, disseminate, and handle messages, documents, and files electronically. Based on the experiment of this system, Lancaster purports in his book that the paperless system will materialize by the year 2000.[7] Regarding the CIA's paperless system, Robert S. Hooper and Susanne Henderson of the CIA's Office of Central Reference have a status report.[8]

In the article, Lancaster first notes three major problems of science communication: the growth of scientific and technological literature, substantial delays in the publication of literature, and the high cost of the traditional publishing process. He then cites the achievements of online databases in improving the availability and the accessibility of information sources. Based on the problems of the present system and the capability of automation, he finally envisions a paperless communication system in the year 2000. He sees that scientists and other professionals in the future will use terminals in their offices and probably at homes in many different ways, such as "to receive text, to transmit text, to compose text, to search for text, to seek the answers to factual questions, to build information files and to converse with colleagues...."[9]

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In 1979, Lancaster and his coauthors wrote the article, "The Changing Face of the Library." In the work, the author regards the years 1960-1980 "as the period of transition from print on paper to electronic publication." They foresee that in the 1980's, many non-library professionals will begin to conduct their own searches for online information, academic and special libraries will allocate an increasing portion of their budget "to purchase of on-line access to information sources ... at the expense of outright purchase," the physical growth of these libraries will be dramatically curtailed, their collections will even be considerably reduced, etc. By the end of the 1980's, "a majority of the North American journals in the sciences and social sciences could be accessed online," and some print journals will begin to be completely replaced by electronically published products.

According to these authors, in 2001, "publication in print on paper form is the exception...," and "the wide move to electronic communication has served to narrow the gap between the 'information rich' and 'information poor' countries rather than widening it."[10] In the same year, Lancaster published the article, "Mission Possible," in which, he creates a scenario of future electronic journals. He depicts the publishing processes of these journals and anticipates the popularity of electronic mails among professionals.[11]

Also in 1979, Lancaster and his coauthors of the previous article presented a research report to the Sixteenth Annual Clinic on Library Applications of Data Processing. They incorporate and repeat in their report the scenario described in the above works.

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In addition, they again review the problems facing traditional print publishing, such as the growth of information, the escalating costs, as well as the inefficiency of the current publishing process. They also display the results of a Delphi study, one of which indicates that 40 % of interviewees responded that the publishers of reference books will replace their print versions with electronic forms by the year 1985.[12]

In 1981, Lancaster, and Herbert Goldhor at the Library Research Center, the University of Illinois' Graduate School of Library Science, published the results of a survey study. The survey was performed "to cast some further light on the impact of online services on sales of print on paper." In the survey, about 9 % of the respondents indicated that their cancellations of subscriptions to print publications were influenced by the availability of online services, and about 60 % were not influenced by this fact. The authors conclude accordingly that "online access has so far had only a relatively small effect on cancellation" of print publications.[13]

In 1982, Lancaster pulled together the above published works and presented "a coherent whole,"[14] a book cited in the beginning of Chapter One, as a rendezvous of a major campaign to besiege print-on-paper publishing and libraries. In this publication, Lancaster first cites the works by Daniel Bell,[15] Peter F. Drucker,[16] Alvin Toffler,[17] and others depicting the rapidly changing world due to the movement from an agricultural society to an industrial society and then to a post-industrial society. He then repeats and embellishes many points that he and his associates have argued in their previous works, including technological capabilities, economic

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considerations, current realities, and the scenario of publishing evolution.

"The credibility of a transition to a largely electronic society depends," Lancaster says, "on the availability of terminal devices."[18] The projections on the availability of computers as well as the capabilities of new technologies seem all optimistic. According to Audrey Clayton and Norman Nisenoff, "by the year 2000, there will be two telephones and two terminals for each inhabitant in the United States," and the coming "Megadoc ... can store 500,000 pages of journal text on a single side."[19]

Lewis M. Branscomb, Vice President of International Business Machines Corp. (IBM) anticipates that "the full text of 40,000 books could be transmitted from Washington, D. C. to Los Angeles in approximately one hour."[20] The new technologies not only have huge storage capacity and instant transmission speed, they also offer inexpensive cost. William J. Kubitz, Professor of Computer Science at University of Illinois, Urbana-Champaign, suggests that "library patrons ... would simply have [a videodisc] made containing the books they wanted at ... only 0.1 cent per book plus the recording charge."[21]

In comparing the cost of electronic publishing with that of print publishing, Richard C. Roistacher, Professor at the University of Illinois' Center of Advanced Computation, reports his experience that in 1978 online composition cost approximately $5.40 - $7.50 per published page in contrast with $25 -$28 per page for the conventional composition.[22] Quoting from Hugh Folk's work, Lancaster states that both for storage and transmission, electronic

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publishing costs much less than print publishing would.[23] In criticizing Harry R. Collier's hypothetical data on the economic aspects of the use of online services, he points out that printed services cost the library a fixed amount of dollars even when the services are not used. In the online situation, Lancaster claims, "access is paid for only when necessary."[24]

In the real world, computers have been employed for conferencing, electronic mail, publishing, and many other library operations. New technologies, such as facsimile transmission, two-way television, hypertext, etc. have been emerging or are under experimentation.[25] On the grounds of these phenomena, fortified by the results of two survey studies previously described, Lancaster therefore, concludes that by the year 2000, electronic publishing will replace print-on-paper publishing, and libraries will be disembodied.[26]

In the same year when Lancaster compiled his book, James Thompson, Librarian at University of Reading, also published his work. Thompson basically echoes, and in many places, quotes, Lancaster's words. He envisions libraries as being, like dinosaurs, far too large, such that they are inaccessible, inefficient, and unusable. The printed page is passive; the new technology can store, process, and transmit information "to everybody anywhere in the world." Therefore, "the age of printing is over," Thompson proclaims. "Gone are the tons and tons of printing type." And libraries, like dinosaurs, will inevitably be extinct.[27]

In the following year, Lancaster repeated and reemphasized the stages of his electronic evolution in a condensed article en-

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titled "Electronic Publishing...."[28] Also in 1983, Elie A. Shreour, Director of the Bio Systems Research, envisioned a tele-printing system. Shreour speculates that, with this system, selected texts can be transmitted from a central databank, "where every possible book on every possible subject has been stored," and printed onto book-like "blank visual tapes." He says that the technology for this speculation might rely on "an advanced form of a liquid crystal display," which exists now in a primitive form. The system "would bring to each individual potential access to the total score of the written word on every subject and in every language." The indication is that the system "would eliminate libraries ... [and] the publication of books." He then expects that the book of the future would evolve before the end of this decade.[29]

In 1985, Lancaster "revisited" his paperless society. In the visit, he became more flexible than he has been. He did not talk any more about the year 2000 and about the disembodiment of libraries. Nevertheless, he is still optimistic about the evolution towards a paperless society. Upon seeing that "computers seem not to have reduced the production of paper," he expects "a young generation, growing up with a diet of computers and electronic games, may be less insistent on the need for paper copy."[30] Lancaster does not stop here. The year after the above visit, he stepped forward to The Wordless Society,[31] which can be regarded as being akin to the previously mentioned concept of Lu's wordless heaven-book.

In the field, evidence indeed indicates that Lancaster has reason to be more optimistic than before about his publishing evolution. For example, Martha E. Williams reports that the database

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Table 3.001

ONLINE DATABASE USAGE, 1974 - 85*

(in 1000)

Year	No of Searches
1974	700
1975	1,000
1976	1,200
1977	2,000
1978	2,700
1979	4,000
1980	6,000
1981	7,800
1982	9.900
1983	12.600
1984	15.800
1985	18.000

*a. Data for 1974 - 1979 were obtained by telephone calls.
b. Data for 1980 and 1981 were extrapolated.
c. Data for 1982 - 1985 are based on Information Market Indicators reports.

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industry "has grown continuously at a rate of roughly 20-25 percent per year."[32] She further reports that

> between 1975 and 1985, the number of databases grew from 301 to 3,010 -- a 10-fold increase. The number of records in those databases grew from 52 million to 1.68 billion -- more than a hundred-fold increase."[33]

In addition, she traces and compiles a list of database usage by the number of online searches from 1974-85. Table 3.001 on the previous page is the list provided by Williams.[34]

Similarly, Carlos A. Cuadra also reports a growth trend in database activities. According to him, since 1979 the number of databases has risen from 400 to 3,699; the number of database producers, from 221 to 1,685; and the number of online venders, from 59 to 555.[35] Furthermore, the Association of American Publishers reports in a 1984 survey that "80 % of responding authors expect to prepare manuscripts electronically in 1985, compared to 20 % who did so in 1980...."[36] Recently, Roger K. Summit, President of Dialog Information Services, Inc., anticipates "some 30 million home computers with modems and relatively inexpensive telecommunications by the end of 1988."[37]

Coexistence Theory

While electronic delivery of information has many benefits to users, print on paper also has various advantages. Jenny Rowley, Senior Lecturer at Birmingham Polytechnic, offers a table listing the many merits of books.[38] Dan Lacy, Senior Vice President at McGraw-Hill, Inc., echoes a similar view on the benefits of books. "Books still perform better than any other medium the services within their

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special competence," Lacy says. They are "inexpensive, compact, portable, requiring no equipment to use and pleasing to handle and read."[39] Efrem Sigel, Editor-in-Chief of Knowledge Industry Publications, repeats that "the printed and bound book is too convenient, low-cost, and familiar to yield to any electronic surrogate."[40]

Economically, Donald W. King and Nancy K. Roderer at King Research, Inc. conducted a cost analysis of scientific and technical communication in the United States in 1978. In concluding the research, the investigators "find virtually no difference in cost between the paper-based journal system and its electronic alternatives."[41] William J. Baumol and Sue Anne Batey Blackman at Princeton University have analyzed the costs of computerized operation of libraries and conventional operation. The result of their analysis is that the expectation of lower costs of computerized operation than those of manual operation has not materialized. "The reason is that the very decline of computer hardware prices has increased the share of software and other labor-intensive activities in ... computer operation."[42]

In this regard, Brett Butler, Publisher of Electronic Publishing Business, has this remark:

> The claim that electronic distribution will 'save the cost of print' ignores the fact that only about 10 percent of a scholarly publication's expenses are for actual print, and that the 60 percent or so that represent editorial and managememt costs will not change with electronic distribution.[43]

Oldrich L. Standera finds from his experiment at the University of Calgary that, with cost benefit concern, the electronic journal is

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ranked lower than the conventional journal. He then concludes his study with a similar view to that expressed by Butler quoted above:

> The expectation that electronic publishing will mean less cost is unrealistic. Some costs would be entirely or partially eliminated ... but other costs will arise.... The cost of hardware will continue to decrease while costs of software and human services will grow....[44]

Marvin Cetron, President of Forecasting International, maintains that user acceptance is vital for the establishment of any technological invention.[45] In this respect, print on paper is usually preferred to the electronically published products. Standera, for example, also finds from the above experiment that the conventional journal ranks the highest acceptance rate by readers. On the contrary, the electronic journal receives a very low acceptance rate in the experiment.[46]

In the market, it is apparent that electronic publishing in many experimental prototypes is either staggering for survival, or has completely failed, let alone imposes any real threat on the gigantic "dinosaur" of print publishing. The reality is that Thompson has announced the death of the electronic Journal of Medical Chemistry, a full-text database on BRS, before "the end of libraries,"[47] and Butler has another obituary for Information Publishing, an online journal for Information Access Corporation.[48]

Similarly, Alan Singleton reports that in the first year after the EIES was established, it published little and had no subscriptions.[49] Murray Turoff and Starr Roxanne Hiltz at the New Jersy Institute of Technology give the same account on the EIES. "Months went by before a single person submitted an article," they

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say. "The ambitious plans for a steady stream of published articles, advertising, and public access had to be abandoned."[50]

Jerome S. Rubin, Vice President at the Times Mirror Company, reveals that "few textual information businesses are making any real money." He says, "the New York Times Company lost considerably more than $10 million during its 10-year adventure with The New York Times Information Bank."[51] Time Inc. quit its teletext and videotex project after having "hired and fired 104 people and spent $20 million," as reported by Sean J. McCarthy, President of Time Video Information Service, and Herbert S. Dordick, faculty member at the University of Southern California's School of Communications, in their articles.[52,53]

Priscilla Oakeshott, Director of Plato Publishing, discloses that the British BLEND experiment, after the EIES ceased, ended in 1984, and its primary project, the LINC, was disbanded. The members of the BLEND system were aware of no "imminent revolution in publishing." They were also aware that "online authorship seems not to be immediately attractive,"[54] and were, therefore, not surprised when the system ended with very limited achievements.

Robert J. Spinard's vision of "The Electronic University"[55] is ideal. The reality of Barbara B. Moran and her coauthors' "The Electronic Campus" at Brown University is quite different. The Brown project was "scaled down" immediately after its initiation. "Although the campus was considered wired," according to the authors, "the wiring goes only to the outside of the buildings."[56] Moreover, Delores Meglio, Vice President at Information Access Company, learned in 1986:

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> Two ambitious online full text services -- the videotex programs of Knight-Ridder and the Times Mirror Companies -- have been abandoned. Despite investments of $50 million in one service and $40 million in the other, neither was able to attract and sustain the subscribers and use necessary to encourage continued investment in their development.[57]

As Lancaster and his associates have maintained, the availability of computers and other new technologies is a key element for their electronic revolution. However, the keys for the expected revolution are still far from available to most people. As the Editor of Electronic Social Psychology (ESP), an online journal for social psychologists, Bruce Morasch remarks: "most social psychologists simply do not have the equipment needed to use ESP," and those do have it have not used it much.[58]

Gayle McKinney and Anne Page Mosby of the Georgia State University Library surveyed online searching in United States colleges and universities in 1986. Their finding is that only "41.8 % of academic libraries offer in-house searching, while 58.2 % do not."[59] Mary Jo Lynch reports the result from a survey conducted in 1987 that "over 19 % of all public libraries answered 'yes' to the question" whether they offer online database searching, and "only 9 % offered it in libraries serving less than 10,000" of population.[60]

In an earlier survey, the ALA Office for Research reports that as of 1986, "over 43 % of public libraries serving populations of over 25,000 had microcomputers for public use."[61] In public school libraries, the figures reported by the United States Department of Education's Center for Education Statistics are that in 1985, only 4 % had database search services in-house for students,[62]

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39 % had microcomputers for the use of students.[63] EDUCOM, a Princeton-based consortium of institutions of higher education, reports that only 13 % of students in the higher education institutions surveyed have their own micros.[64]

In respect to the availability of home computers, George Gallup has a different view from that offered by Clayton and Nisenoff cited above. He remarks in his Forecast 2000 that "desktop computers certainly won't be found in every home, at least not in the near future." He cites the anticipation made by market analysts and says that, by 1990, "20 percent of U. S. households will have home computers." He further quotes the report from the National Science Foundation and predicts that "perhaps by the end of the century, we'll actually be up to the 40 percent of homes with two-way videotex systems."[65]

Although the actual availability of the new technology and its services is still very limited in libraries and for use of professionals, "the library market has been pretty well saturated for the last few years" for online database services, as reported by Carol Tenopir.[66] The Cuadra/Elsevier's directory also "shows slowdown in growth of online databases."[67] It may be due to the market reality that Summit has become worried and urged that "online retrieval services should actively seek out and develop online searching within school districts"[68] in order "to create mass [online] demand."[68] It is noteworthy that Los Angeles County is still looking "forward to bringing the county's 91 local libraries online by the year 2000,"[69] the beginning year of the paperless

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society that Lancaster predicted.

It is also worth noting the emotion laden voices of library educators and practicing librarians about the electronic revolution. Dorothy N. Brown at Nairobi Evangelical Graduate School of Theology Library demands: "It is good for the information-rich Western world to stop for a moment and think of the information-poor developing countries where access to electronic publication is only a dream."[70] This voice is inharmonious with Lancaster and his coauthors' claim cited above that "... electronic communication has ... narrowed the gap between the 'information rich' and 'information-poor' countries."[71]

In referring to Kilgour's EIDOS described in Chapter Two, Samuel D. Neill, Professor of Library Science at the University of Western Ontario, asks Kilgour not "to put libraries down ... in order to get his machine used.... Mr. K will have to scale down his device to get it priced for the mass market."[72] Will Manley, Director of the Tempe (Arizona) Public Library, laments: "The business of library shelves being filled with technological toys...." He asks: "Are librarians trying to ruin libraries? Do they no longer believe in the value of the good books...?"[73]

In contrast with the development and use of online databases highlighted earlier, below are a few selected summarized statistics pertaining to book publishing and use. Lacy points out in one of his works cited earlier that there is no evidence of print on paper being contracted due to the impact of the new technology. He states:

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> In 1950, when the impact of television first began to be felt, 11,022 books were published in the United States. In 1970, when the impact of the computer began to reach major proportions, the number of books had risen to 36,071. In 1979, after almost 30 years of television and 10 years of major computer use, 45,182 books were published in the United States. Book publishing revenues in the United States in 1950 were less than $500 million; in 1970, they were more than $2.9 billion; in 1980, more than $7.0 billion.[74]

In summarizing the 1983 Consumer Research Study on Reading and Book Publishing, Joseph F. Brinley, a consultant to the Center for the Book, reminds us of the fact that "94 percent of Americans are readers of books, magazines, or newspapers." Among them, 50 percent read one or more books in the six months prior to the study, "and almost 86 percent of these book readers also read newspapers."[75] Drawing data from various sources, Daniel J. Boorstin, then the Librarian of Congress, reports:

> Domestic expenditures on books, which showed an average annual increase of 10.3 percent in dollars from 1979 to 1983, are projected by industry statisticians to show an average annual increase of 13 percent in dollars from 1983 to 1988. Sales for the industry rose from $3,177,200,000 in 1972 to $8,821,700,000 in 1983. The number of U. S. book titles published has been increasing moderately in most years from the last decades -- from 38,053 in 1972 to 53,380 in 1983....
>
> The amount of money spent for buying books is increasing, and this trend is expected to continue. U. S. expenditure on books rose by 47.8 percent, from $7,304,500,000 in 1979 to $10,798,300,000 in 1983. The number of bookstores has increased significantly, from 11,786 in 1973 to 19,580 in 1984....
>
> .....

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> ... the numbers of books publishers in the United States has increased from 1,250 in 1972 to 2,128 in 1982....

And, Boorstin says, the computer itself has added to the publishing industry "over six thousand books and five hundred periodicals."[76]

In a trend analysis of volumes added to the Association of Research Libraries, this writer concludes based on the result of the analysis that "in the year 2000, libraries would probably add a steady number of books to their collections as the ARL libraries did in the past 19 years"[77] Apparently, this conclusion is inconsistent with Lancaster and his coauthors' forecast that, in the 1980's, academic and special libraries' collections will be reduced.[78] In the University of Illinois annual survey, Goldhor estimates "the total U. S. public library circulation in 1986 to be 1,154,400,000...."[79] He explains that "circulation per capita increased almost one-fifth from 1980," and "the index of Public Library Circulation increased over 12 % from 1977 to 1986."[79]

There is evidence showing that in the face of the threat of the demise of print on paper, organizations such as ALA, the Library of Congress, and others are making efforts to preserve books. For example, during its 1988 midwinter meeting in San Antonio, ALA passed a resolution to urge "publishers and federal, state, and local governments to use permanent paper for books and other publications considered of enduring value."[80] The Library of Congress has recently published Otto L. Bettmann's book, The Delights of Reading,[80] "to insure that books are not buried ... nor ... obscured by specious alternatives and synthetic substitutes."[82] In this work, glorious words on books and reading are taken from

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people of all sorts and from all ages. Copied below is one of its quotations:

> Books are the carriers of civilization. Without books, history is silent, literature dumb, science crippled, thought and speculation at a standstill. They are engines of change, windows on the world, "lighthouses" (as a poet said) "erected in the sea of time." -- Barbara W. Tuchman.[83]

Moreover, Edward Tenner, Executive Editor at Princeton University Press, provides these facts in a recent article:

> From 1959 to 1986, America's consumption of writing and printing paper increased from 6.83 million to 21.99 million tons, or 320 percent ... between 1981 and 1984 alone, American business use of paper grew from 850 billion to 1.4 trillion pages. Between 1986 and 1990, printed material may rise again, from 2.5 trillion to 4 trillion pages.[84]

Having these facts in mind, Nancy Nelson, author in the library and information field, notes that this incredible increase in paper consumption has come about in a time of the microcomputer and online revolutions. She notes that computers and online services themselves, as Boorstin has pointed out, add a great deal of volume to the consumption of paper. "Paper is here to stay," she hails. "A paperless society ... is an undesirable one."[85]

While Lancaster, along with his associates, has applied the Delphi study to justify his belief in replacing print on paper by the year 2000,[86] a poll of opinions expressed in the literature will certainly result in a different conclusion. The contributing authors in Books, Libraries, and Electronics, such as Efrem Sigel, Dan Lacy, Robert D. Stueart, and others, all take an opposing view to that held by Lancaster and his associates when discussing the

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impact of electronic publishing on print publishing.[87-89] In the foreword of the book, Carol A. Nemeyer, former Associate Librarian at the Library of Congress, has this comment: "After reading this book, I think the vote is in. Books will survive, and so will many other forms of communication...."[90]

A majority of authors included in, and the members of the Advising Committee on, Books in Our Future also disagree with Lancaster's view. For example, in their article contributed to the book, Charles A. Goodrum and Helen Dalrymple remark: "Of the one hundred people we interviewed, the overwhelming majority looked at the future of the book with eager, optimistic anticipation."[91] The opposing view is again expressed by the overwhelming majority of authors covered in Meredith Butler's review article,[92] and in Electronic Publishing Plus edited by Martin Greenburger.[93]

Arthur Jack Meadow,[94] Anthony Kelso Kent,[95] Samuel D. Neill,[96] OAL's Working Group,[97] Gorden B. Neavill,[98] Patricia Battin,[99] S. Thomas Dunn,[100] Brett Butler,[101] Robert M. Mason,[102] and many other authors who have contributed articles to various publications all have a positive opinion on the future of print-on-paper publishing. In line with these authors, King, in commenting on an electronic and paperless society, remarks that he just doesn't think "it is going to happen." He says:

> Not all publications or articles lend themselves to an electronic alternative.... We feel that the strongest candidates for an electronic alternative are articles that are infrequently used but are useful for a long time. These articles tend to be found in journals with small circulation....[103]

Edward M. Walters distinguishes, in another article, cumu-

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lative knowledge from noncumulative knowledge, and basic research from applied research. He anticipates that for cost-effectiveness, "the publishers of ... expensive scientific journals ... will use the new technologies as a means to design new services...," and "the noncumulative disciplines doing applied research are prime territory for the application of new technologies."[104] In other words, each medium has its distinct function; the new technologies will only supplement, not replace, the functions of printed media. In a speech delivered at the Southern Connecticut State University's School of Library Science and Instructional Technology, Thomas J. Galvin declares that "print will continue ... to be the medium of choice for many important forms of recorded knowledge well beyond the year 2000."[105]

Comment

Reviewed above are two contradictory viewpoints on the likely impact of electronic publishing on print publishing. In connection with this argument, this writer points out several critical issues in his review articles.[106,107] Some of these issues are iterated below:

1. Each side of the argument has been presenting a limited view on one side of the issue. The viewpoints discussed in the literature on both sides are mainly personal beliefs, opinions, and statements without substantiated support. Few studies have involved more than one variable correlated one with another.

The advocates of the demise of books and the end of libraries include the evidence that the numbers of computer terminals,

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online databases, and their usage have been dramatically increased and will continue to increase. The book defenders cite the reality that the number of technological toys is still far from being a driving force for an electronic revolution. On the contrary, the number of books being published, sold, and circulated, and paper consumption have also been growing substantially. The apple-and-orange argument does not justify the position of either side.

The pessimistic futurists of print on paper accuse books of being static, passive, and not cost-effective. The book lovers counter that the computer screen is still limited for presenting information. Both sides may be correct; but the subjective views cannot lead to a justifiable solution to the argument.

2. The results of a few correlated studies are either insignificant or contradict each other. No one in the argument can take seriously any of the results to substantiate his stand. Lancaster has no solid ground to support his claim that print publishing will be replaced by electronic publishing, and libraries, disembodied by the year 2000 based on the minor effect of the availability of online access on the cancellation of subscriptions to print on paper.[108]

With regard to this particular point of argument, Jonathan Newcomb at Standard & Poor's Corporation reports that three years after S & P developed an electronic version of its Blue List, "the print subscription base is up." He says that "in the case of other publishers who have chosen to introduce an electronic form of a printed product, no noticeable drop in the printed subscription level has been experienced." [109] In addition, Inez L. Sperr,

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Executive Director of Migration Information & Abstracts Service, also concludes her survey with the result that online availability has no effect on the attrition of subscriptions to print journals.[110]

3. Lancaster and his coauthors' Delphi study is questionable. In the study, they ask the question of when electronic publishing will be expected to occur.[111] The result of the study may be quite different if the question is whether or not print publishing will exist in the year 2000.

4. In arguing the issue, no one realizes that the total replacement of books and disappearance of libraries will depend on the complete fulfillment of full electronic publishing. In the surveys conducted by Lancaster and Goldhor, Sperr, and others, most online databases are reference or secondary publications, which still refer information seekers to the off-line paper products, mainly stored in libraries. These databases only facilitate the use of printed products and libraries rather than replace or displace them.

Even if the survey of reference databases may have some implications for the electronic revolution, there is also no one pointing out in the reviewed literature that the realization of the paperless society will depond on the fact that various electronic products are widely and evenly used by different demographic groups of people. There are no grounds for any one to make a claim for the coming of a completely paperless society when he only sees a handful of information intermediaries in the libraries of graduate schools huddling around computer terminals searching Dissertation Abstracts Online.

In short, the issue of the likely impact of electronic pub-

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lishing on print publishing surfaced in the 1960's, when Bolt, Beranek, and Newman, Inc. published the book, Toward the Library of the 21st Century.[112] However, as stated earlier, there has been no study which can lead to a substantiated and satisfied answer to the issue. The prediction made by Lancaster and his associates is based on non-significant, contradictory research results, and on biased and incomplete studies, such that it is invalid and unreliable. The present work, therefore, was designed to reexamine the issue, and to provide a substantially supported study of the likely impact of electronic publishing on print publishing.

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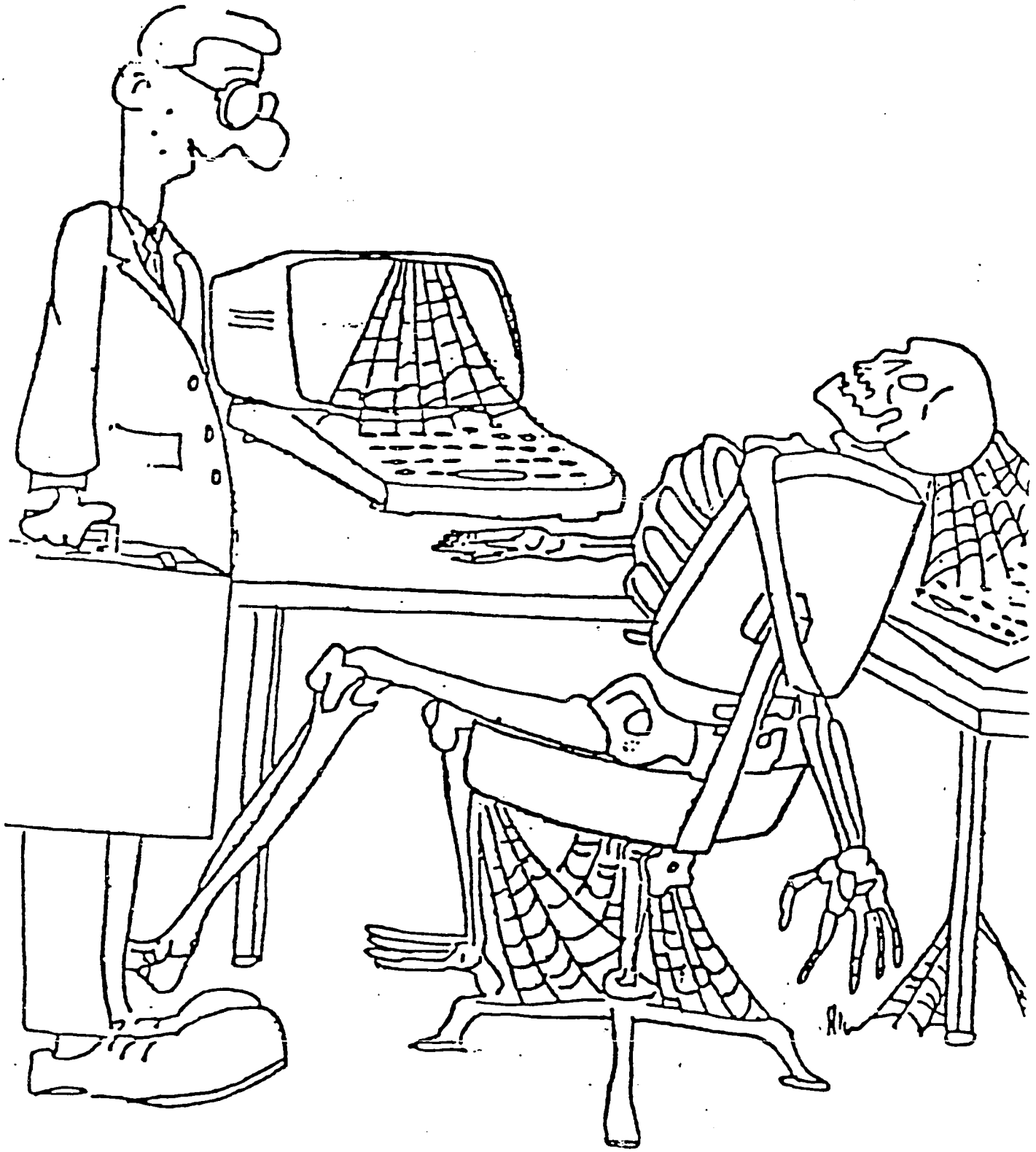

"System Been Down Long?"

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Chapter Four

CONCEPTUAL FRAMEWORK OF THE STUDY

Assumptions

The present work was undertaken with the following general and specific assumptions:

1. General Assumptions.

(1) As indicated in the literature particularly by Lancaster,[1] Thompson,[2] and their associates, it was assumed that the development of electronic publishing and the growth of print publishing were interactive, or reactive.

(2) As exploratory research, it was assumed that the limited number of libraries, endusers, and the time span chosen for the study could function as the representing subsets of the universal activities of the two publishing enterprises. In turn, it was assumed that the results of the study could be generalized and extrapolated to infer future phenomena related to the two sets of variables under study.

(3) Since the word "library," originated from the Latin "liber" meaning a book, refers to a collection of printed books,[3] it was assumed that the status of libraries is closely associated

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with print on paper, and that the implication pertaining to print publishing resulting from the study would also infer the future status of libraries.

(4) External elements, such as natural factors, social crises, the possible competitors of new inventions, etc., were not considered; they were assumed to be isolated and to have no effect on the study.

2. Specific Assumptions.

(1) Because of the replacement theory of Lancaster,[4] Thompson,[5] and others, the present study assumed negative correlations between the two sets of variables representing electronic and print publishing. The negative correlation means that the activities of one set of variables would affect negatively those of the other set of variables.

(2) On the other hand, because of the opposing view reviewed in the previous chapter, this study assumed a positive position that there were variances among different factors within the electronic publishing group under investigation. The assumption was made on the argument that various products of electronic publishing had not been evenly developed, used, and accepted among different demographic groups of people.

Exploratory Research Questions

Based on the research problem raised, and the objectives set, in Chapter One, and the literature reviewed in Chapter Two and Three, the primary and the related research questions were developed and stated as follows.

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1. Primary Research Questions:

(1) Was there a relationship between expenditure for the products of electronic publishing and that for the materials of print publishing in the selected libraries during the years chosen for the study?

(2) Was there a relationship between the usage (number of access times) of selected publications in electronic form and that of their corresponding products in print version in the selected libraries during the period chosen for the study?

2. Related Research Questions:

(1) Was there a difference in expenditure for the products of electronic publishing among the three selected libraries during the years chosen for the study?

(2) Was there a difference in expenditure for the materials of print publishing among the three selected libraries during the years chosen for the study?

(3) Was the usage (number of access times) different among the selected online databases in the selected libraries during the period chosen for the study?

(4) Was the usage of the selected online full-text databases different from that of the selected reference databases in the selected libraries during the period chosen for the study?

(5) Was the usage of the selected online databases different among various age groups of users in the selected libraries during the period chosen for the study?

(6) Was the usage of the selected online databases different among various levels of education of users in the selected libraries

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during the period chosen for the study?

(7) Was the usage of the selected online databases different among various occupations of users in the selected libraries during the period chosen for the study?

(8) Was the satisfaction with the information retrieved from the selected online databases different among various age groups of users in the selected libraries during the period chosen for the study?

(9) Was the satisfaction with the information retrieved from the selected online databases different among various levels of education of users in the selected libraries during the period chosen for the study?

(10) Was the satisfaction with the information retrieved from the selected online databases different among various occupations of users in the selected libraries during the period chosen for the study?

Exploratory Research Hypotheses

On the basis of the above assumptions, exploratory research questions, the main and related research hypotheses were further formulated. The main hypotheses were devised to draw information for answering the questions regarding the relationships between the two main factors representing electronic and print publishing. The related hypotheses, on the other hand, were developed to deal with the variances of different factors within each group of the two publishing establishments, particularly those factors within the electronic publishing group.

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Let H_{1x} represent each exploratory hypothesis; and r_y, the relationship between the two factors of an individual study pair. Further, let $\bar{A}_{iz}$ stand for an obtained mean value of a separate factor within each of the two study groups. The research hypotheses of the study were stated; and their mathematical expressions, formulated, as follows.

1. Main Exploratory Hypotheses:

(1) There was a relationship between the expenditure for the products of electronic publishing and for the materials of print publishing in the selected libraries during the years chosen for the study. And as assumed, the relationship was negative. Mathematically, the relationship was expressed as,

$$H_{1101}: \quad r_{101} < 0.$$

(2) There was a relationship between the usage (number of access times) of selected publications in electronic form and that of their corresponding products in print version in the selected libraries during the years chosen for the study. The relationship, as assumed, was negative; and thus, was expressed mathematically as,

$$H_{1102}: \quad r_{102} < 0.$$

2. Related Exploratory Hypotheses:

(1) There was a difference on expenditure for the products of electronic publishing among the three selected libraries during the years chosen for the study. The hypothesis was presented in mathematical formula as,

$$H_{1201}: \quad \bar{A}_{2011} \neq \bar{A}_{2012} \neq \ldots.$$

(2) There was a difference for expenditure for the materials

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of print publishing among the three selected libraries during the years chosen for the study. The hypothesis was presented in mathematical formula as,

$$H_{1202}: \quad \bar{A}_{2021} \neq \bar{A}_{2022} \neq \ldots.$$

(3) The usage (number of access times) was different among the selected online databases in the selected libraries during the period chosen for the study. It was presented in mathematical formula as,

$$H_{1203}: \quad \bar{A}_{2031} \neq \bar{A}_{2032} \neq \ldots.$$

(4) The usage of online full-text databases was different from that of the selected online reference databases in the selected libraries during the period chosen for the study. It was presented in mathematical formula as,

$$H_{1204}: \quad \bar{A}_{2041} \neq \bar{A}_{2042} \neq \ldots.$$

(5) The usage of the selected online databases was different among various age groups of users in the selected libraries during the period chosen for the study. Mathematically, it was formulated as,

$$H_{1205}: \quad \bar{A}_{2051} \neq \bar{A}_{2052} \neq \ldots.$$

(6) The usage of the selected online databases was different among various levels of education of users in the selected libraries during the period chosen for the study. Mathematically, it was formulated as,

$$H_{1206}: \quad \bar{A}_{2061} \neq \bar{A}_{2062} \neq \ldots.$$

(7) The usage of the selected online databases was different among various occupations of users in the selected libraries during the period chosen for the study. The mathematical formula was ex-

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pressed as,

$$H_{1207}: \quad \bar{A}_{2071} \neq \bar{A}_{2072} \neq \ldots.$$

(8) The satisfaction with the information retrieved from the selected online databases was different among various age groups in the selected libraries during the period chosen for the study. The mathematical formula was expressed as,

$$H_{1208}: \quad \bar{A}_{2081} \neq \bar{A}_{2082} \neq \ldots.$$

(9) The satisfaction with the information retrieved from the selected online databases was different among various levels of education of users in the selected libraries during the period chosen for the study. The hypothesis was formulated mathematically as,

$$H_{1209}: \quad \bar{A}_{2091} \neq \bar{A}_{2092} \neq \ldots.$$

(10) The satisfaction with the information retrieved from the selected online databases was different among various occupations of users in the selected libraries during the period chosen for the study. The hypothesis was formulated mathematically as,

$$H_{1210}: \quad \bar{A}_{2101} \neq \bar{A}_{2102} \neq \ldots.$$

Exploratory Null Hypotheses

For testing purposes, it was necessary to reconstruct and reformulate the above assumed research hypotheses as null hypotheses. Again, let H_{ox} represent each exploratory null hypothesis; and r_y, the relationship between the two factors of an individual study pair; an $\bar{A}_{iz}$, stands for an obtained mean value of a separate factor within each of the two study groups. The null hypotheses of the study were thus stated; and their mathematical expressions, formulated, as follows.

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1. Main Exploratory Null Hypotheses:

(1) There was no relationship between expenditure for the products of electronic publishing and that for the materials of print publishing in the selected libraries during the years chosen for the study. The null hypothesis was expressed mathematically as,

$$H_{0101}: \quad r_{101} = 0.$$

(2) There was no relationship between the usage (number of access times) of selected publications in electronic form and that of their corresponding products in print version in the selected libraries during the period chosen for the study. The null hypothesis was expressed mathematically as,

$$H_{0102}: \quad r_{102} = 0.$$

2. Related Exploratory Null Hypotheses:

(1) There was no difference in expenditure for the products of electronic publishing among the three selected libraries during the years chosen for the study. Mathematically , it was expressed as,

$$H_{0201}: \quad \bar{A}_{2011} = \bar{A}_{2012} = \cdots$$

(2) There was no difference in expenditure for print publications among the three selected libraries during the years chosen for the study. Mathematically, it was expressed as,

$$H_{0202}: \quad \bar{A}_{2021} = \bar{A}_{2022} = \cdots$$

(3) The usage (number of access times) was not different among the selected online databases in the selected libraries during the period chosen for the study. The null hypothesis was presented in mathematical formula as,

$$H_{0203}: \quad \bar{A}_{2031} = \bar{A}_{2032} = \cdots$$

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(4) The usage of the selected online full-text databases was not different from that of the selected online reference databases in the selected libraries during the period chosen for the study. The null hypothesis was presented in mathematical formula as,

$$H_{0204}: \quad \bar{A}_{2041} = \bar{A}_{2042} = \ldots.$$

(5) The usage of the selected online databases was no different among various age groups of users in the selected libraries during the period chosen for the study. It was expressed in mathematical formula as,

$$H_{0205}: \quad \bar{A}_{2051} = \bar{A}_{2052} = \ldots.$$

(6) The usage of the selected online databases was no different among various levels of education of users in the selected libraries during the period chosen for the study. It was expressed in mathematical formula as,

$$H_{0206}: \quad \bar{A}_{2061} = \bar{A}_{2062} = \ldots.$$

(7) The usage of the selected online databases was no different among various occupations of users in the selected libraries during the period chosen for the study. It was expressed in mathematical formula as,

$$H_{0207}: \quad \bar{A}_{2071} = \bar{A}_{2072} = \ldots.$$

(8) The satisfaction with the information retrieved from the selected online databases was no different among various age groups of users in the selected libraries during the period chosen for the study. In mathematical formula, the null hypothesis was presented as,

$$H_{0208}: \quad \bar{A}_{2081} = \bar{A}_{2082} = \ldots.$$

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(9) The satisfaction with the information retrieved from the selected online databases was no different among various levels of education of users in the selected libraries during the period chosen for the study. In mathematical formula, the null hypothesis was presented as,

$$H_{0209}: \quad \bar{A}_{2091} = \bar{A}_{2092} = \ldots.$$

(10) The satisfaction with the information retrieved from the selected online databases was no different among various occupations of users in the selected libraries during the period chosen for the study. In mathematical formula, the null hypothesis was presented as,

$$H_{0210}: \quad \bar{A}_{2101} = \bar{A}_{2102} = \ldots.$$

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Chapter Five

DATA COLLECTION: METHODS AND PROCEDURES

As explained in the scope section in Chapter One, the present work was conducted as a case study. It employed the survey method to collect data needed for different analyses. This chapter presents the details of subject selection, data collection instruments, data collection procedures, and data organization.

Selection of Subjects

As a case study, three libraries in Atlanta, Georgia were selected. These libraries were Atlanta-Fulton Public Library (AFPL), Emory University Library (EMUL), and Georgia State University Library (GSUL). They were selected based on these reasons: (1) for the convenience and familiarity of the writer, (2) the availability of online services, which represent in this study the variables of electronic publishing, and (3) as representative libraries serving three social domains -- the general public, a private institution of higher education emphasizing law and medicine, and a publicly supported comprehensive liberal-arts university respectively.

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When the survey of the study was conducted in the Spring, 1988, online services in AFPL were provided in the central location only; they were not offered in branches. At Emory University, in addition to the central library, online services were also available in different graduate schools, such as in law, medicine, etc. At Georgia State University, the services were centralized, except that the autonomous law library provided its own online searching.

In the study, different online systems in the three selected libraries were taken to serve as the representative products of electronic publishing. Paper-based books, periodicals, and other on-paper materials were treated as print publications. Two sets of factors were chosen to reflect the activities of the two forms of publishing. One set was the expenditure for the two publishing forms. For this set of factors, related expenditure data of five years, from 1982 through 1986, in the three libraries were taken.

The expenditure for electronic publishing was limited to the costs directly spent on subscriptions to, and searching, different online systems. The costs spent on capital acquisitions, such as the purchase of minicomputers, mainframe computers, or other major equipment were excluded. The costs for creating and maintaining online public catalogs were also not included. During the years set for the survey of the study, CD-ROM and other optical products were not prevalent in the selected libraries. The costs for these items, if any, were out of consideration in this study. The expenditure on print products did not involve the costs for technical processing and for purchasing microforms. For both electronic and

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print publishing, the study did not measure the costs for personnel, housing, and utilities.

Another set of factors was the usage of ten selected online databases and their corresponding versions in print form. As defined in Chapter One, usage in this study was the number of access times to the selected products of the two publishing undertakings. In this set of factors, the data of six months prior to the undertaking of the survey were collected. Ten online databases which have parallel publishing in print form were chosen from the Dialog Database Catalog.

Among the ten databases, four full-text products were selected to serve as a separate study group. For practical reasons, two online encyclopedias in the group were treated as full-texts. Four online reference products were taken out of the ten selected databases as a group tc compare with the full-text group. Those reference databases showing particularly high or low usage were excluded from the comparison group. In addition to the expenditure and usage factors, for descriptive and analytical purposes, collected in the survey of the study were also other variables, such as demographic data, users' opinions, descriptions of online services, etc., details of which are shown in the interview questionnaires presented in the following section.

Data Collection Instruments

1. Personnel Channel.

The administrators, the head reference librarians, and the identified endusers in the selected libraries were solicited to

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provide the necessary data for the study. The administrators or their designees were sought to provide expenditure data. The head reference librarians or their representatives were requested to supply usage data. Ten current or past users of the Dialog online system in each of the three selected libraries were identified and asked to give the data of their usage of the online and print databases. The data provided by endusers were collected for the purpose of verifying those supplied by reference librarians. These administrators, librarians, and endusers were also requested to furnish additional descriptive data mentioned above.

2. Questionnaires.

For collecting the data on various factors related to the study, three sets of questionnaires were constructed. The full texts of the questionnaires are appended at the end of this work. Their titles are listed below:

Appendix 5.A1, Interview Questions with Administrators for Expenditure Information on Online Systems and Print Publications in Three Selected Libraries.

Appendix 5.A2, Interview Questions with Reference Librarians for Usage Information of Selected Online Databases and Print Materials in Three Selected Libraries.

Appendix 5.A3, Interview Questions with Endusers for Usage Information of Selected Online Databases and Print Materials in Three Selected Libraries.

Data Collection Procedures

When the study was being conceived, the libraries selected to

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be included were informally contacted through personal and telephone conversations. The purposes of the informal contact were to explore their willingness to participate in the study, and to gather basic information about online services in each institution. The information included the history and activities of online searching in each library, and the staff member in charge of the services.

After the proposal for the study was accepted by the dissertation committee, the selected libraries for the study were formally contacted. At this time, one library originally included in the study declined to participate and dropped out. The reasons were that the library did not keep the data needed for the study, and the information pertaining to users and to database usage was confidential.

The three libraries included in the study were finally selected. The minor revision of the original plan was reported to, and approved by, the dissertation committee. Initially, the writer planned to ask the reference librarians in the selected libraries to provide a list of current and past users of the Dialog information system, and to interview these endusers directly. After discussion with these librarians, because of the concern about users' privacy, this plan was also modified. The solution was that the involved librarians would render their assistance to distribute the planned and prepared questionnaire at their service stations to the current and past users of the Dialog information system if the users were willing to take part in the survey of the study.

When the above and other details were worked out, four form letters were drafted: one to the administrators, two to the reference librarians, and one to the endusers. The letters are in

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Appendix 5.A4 - 5.A7. The letter addressed to each administrator was attached with a copy of the questionnaire shown in Appendix 5.A1. One of the letters sent to each reference librarian was enclosed with a copy of the questionnaire shown in appendix 5.A2. The letters to individual endusers with a questionnaire appended in 5.A3 were sent to the reference librarians. The administrators and the reference librarians were asked to arrange appointments for personal interviews. The reference librarians were also requested by separate letters to distribute the questionnaire shown in appendix 5.A3 to the endusers of the Dialog information system in their libraries.

About one week after the above letters were mailed, the writer called again the administrators and the reference librarians participating in the study. The calls were made to check if they had received the letters and questionnaires. They were also asked to schedule interviews. After brief conversations with these voluntary participants, different arrangements for answering the questionnaires were made.

The Director and the Reference Librarian of Emory University Library, and the Director of the Georgia State University Library preferred to be interviewed over the telephone. When several questions about the contents of the questionnaires were asked and answered, they responded that the questionnaires sent to them would be returned by mail immediately. The Reference Librarian of Georgia State University was interviewed personally in one of the university's cafeterias. The Deputy Director of Atlanta-Fulton Public Library represented both the administrator and the reference librarian. He was interviewed to answer two relevant questionnaires in the

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student lounge at the Atlanta University's School of Library and Information Studies, where the investigator was employed when the interview took place.

As indicated, copies of the questionnaire addressed to the endusers were distributed through the reference librarians of the participating libraries. For this purpose, about 25 copies of the related questionnaire, along with a cover letter and a self-addressed-stamped return envelope, were delivered to each of the three libraries. Randomization and sampling were not considered. The librarians were only asked to distribute the questionnaire to as diverse as possible a population of users with different ages, educational backgrounds, and occupations. Otherwise, they could hand out the questionnaire to any user of the Dialog online system at any time before the deadline date.

At the end, the data needed for the study were collected from the adminstrators and the reference librarians. In addition, 11 users from AFPL, 10 users from EMUL, and 14 users from GSUL responded. Later, 10 of the most complete copies of the questionnaire from each library were selected and included as the data sources of the study.

In the process of the survey, some minor problems were encountered. First, the survey questionnaires did not spell out clearly what should be included and excluded in reporting data related to electronic publishing. One administrator indeed asked for clarification in order to report his expenditure data properly. Second, most libraries did not have detailed usage records for each database and users' information, especially for print materials.

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Third, the librarians were not quite sure about the future funds for online searching. Therefore, the usage data and the projected funds for future online searching were roughly estimated.

Fourth, the responses from endusers were slow and not enthusiastic. During the survey, the writer directly contacted several qualified users and encouraged them to take part in the study. He also asked several librarians in addition to the designated intermediaries of the survey to identify users for the study. Most respondents from AFPL were actually from this channel of personal contact. Fifth, when copies of the questionnaire were received from endusers, many did not provide the actual data needed for the study. The problem was that although the users had made a request for searching on the Dialog system, either they did not search any of the selected databases, or they simply could not be sure which database the librarian had searched for them.

Data Organization

When all interview questionnaires were received and evaluated, the data were sorted and tabulated. Listed below are a total of 24 tables of these collected data. The tables are arranged in the order of 000, 100, and 200. The tables under number 000s contain descriptive data. The tables under number 100s and 200s consist of data collected for the analyses to test the main (100s) and related (200s) null hypotheses stated in the previous chapter. The tables are further numbered following the order of the stated null hypotheses.

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Table 5.001

MAJOR ONLINE ACTIVITIES AND TEN-YEAR BUDGET PROJECTION IN THREE SELECTED LIBRARIES, REPORTED BY ADMINISTRATORS

Question	Atlanta-Fulton Public Library	Emory University Library	Georgia State University Library
1. When did your library start online services?	1980	1975	1981
2. What is/are your initial online system/s?	Dialog	BRS, Dialog	Dialog
4. What online systems does your library use now?	BRS, Dialog, Wilsonline	BRS, Dialog	BRS, Dialog, Medline
9a. Indicate an annual percentage of probable budget increase for online services in your library in the next ten years:	10 - 29 %	10 - 29 %	10 - 29 %
9b. Indicate an annual percentage of probable budget increase for print materials in your library in the next ten years:	30+ %	10 - 29 %	1 - 9 %
10. Indicate an annual percentage of probable reallocation of book budget to support online services in your library in the next ten years:	0	0	1 - 9%

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Table 5.002

DESCRIPTIVE DATA ON THE USE OF SELECTED PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY LIBRARIANS

Question	Atlanta-Fulton Public Library	Emory University Library	Georgia State University Library
7. Does your library charge for online searches?	yes	yes	yes
8. On an average, how much does your library charge for each minute?	4.50	$ 5.00	$ 4.00
9a. Does your library have special funds to support users' online searches?	no	yes	yes
9b. The amount of the special funds:	-	do not know	10 % of cost for students; $ 250 per search for faculty
9c. The source of the special funds:	-	library budget	library budget; research funds
11. Can users have access to a terminal to do online searches?	no	no	no
12. How often are printouts requested?	80-100 %	100 %	80-100 %
13. What is the most important role of librarians in online services?	intermediary	intermediary	intermediary/educator
14. What are the advantages of using online services?	speed, recency, fuller coverage, Boolean search	speed, saving time, covering many years	speed, Boolean and keyword search, packaged, specificity
15. What are the disadvantages?	cost	cost, requiring skills, underdeveloped in humanities	cost, extra time, more staff, updating skills
20. What are the advantages of using print publications?	permanence	easy to use, well liked, free to users	subject search, browsing, immediacy, education, comfort
21. What are the disadvantages?	time lag	lacking flexibility, not up to date, time consuming	no currency, needs right headings, slow, time, dropping

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Table 5.003

PROJECTED FUNDS FOR ONLINE SEARCHES IN THREE SELECTED LIBRARIS
1988 - 92, REPORTED BY LIBRARIANS

($1,000)

Year	Atlanta-Fulton Public Library	Emory University Library	Georgia State University Library	Sum
1988	17	17	115	149
1989	19	20	132	171
1990	22	23	137	182
1991	26	26	157	209
1992	27	30	180	237

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Table 5.004

ENDUSERS' CHARACTERISTICS OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY LIBRARIANS

(% of Total No. of Access Times)

Category	Online Publications				Print Publications			
	AFPL	EMUL	GSUL	AVG	AFPL	EMUL	GSUL	AVG
By Age								
20 & Younger	25	40	20	28	40	50	10	33
21 - 35	45	30	50	42	40	25	25	30
36 - 55	29	30	25	28	17	20	40	26
56 & older	1	0	5	2	3	5	25	11
Sum	100	100	100	100	100	100	100	100
By Education								
Hi Sch & Under	10	0	0	3	5	0	0	2
College Education	30	70	30	43	70	50	40	53
Graduate Education	60	30	70	54	25	50	60	45
Sum	100	100	100	100	100	100	100	100
By Occupation								
Faculty/educators	8	10	60	26	7	20	60	29
Professionals	20	8	5	11	25	8	0	11
Students	70	80	35	62	52	70	40	54
Others	2	2	0	1	16	2	0	6
Sum	100	100	100	100	100	100	100	100

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.
AVG: Average.

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Table 5.005

DESCRIPTIVE DATA ON THE USE OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY ENDUSERS

QUESTION	AFPL	EMUL	GSUL	Sum
5. How did you first learn about online services in the library?				
librarian	4	6	3	13
friend		2	2	4
library announcement	3		1	4
institution newspapers	1	1	1	3
other sources	2	1	3	6
8. Who actually did online searches for your information?				
by a librarian without my presence	4	6	1	11
by a librarian with my presence	6	4	6	16
by myself without help			3	3
9. Are you interested in actually doing online searches?				
yes	9	5	8	22
no	1	5	2	8
10. Have you ever read an article on screen?				
yes	6	4	3	13
no	4	6	7	17
11. About how long did it take you to read the article?				
(minutes in average)	12	9	7	9
13. How often did you request printouts of your search results?				
80 - 100 %	10	9	5	24
40 - 59 %			3	3
00 - 19 %		1	1	2
14. On an average, how long did it take to receive the printouts?				
immediately	2	6	1	9
1 week	7	3	8	18
3 weeks	1			1
15. Did you have to pay a fee for online services?				
always	3	4	5	12
partially	2	6	3	11
no	5		2	7

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16. On an average, how much did you pay for each search request?				
($ in average)	19	8	15	14
17. Who was responsible for the payment?				
myself	3	9	5	17
my institution	6		3	9
self & institution		1	2	3
18. Will you continue to use online services at the present price if you are personally responsible for all charges?				
yes	4	7	7	18
no	5	3	2	10
21. What is the most important role of librarians in online services?				
an intermediary	4	4	4	12
an educator	2	1	2	5
a counselor	1	1	1	3
an expert	3	2	2	7
other		2		2
24. Who actually did the search for your information from the selected print publications?				
by myself without help	10	4	6	20
by myself with help		1	1	2
by a librarian with my presence		3		3

AFPL: Atlanta Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.

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Table 5.006

OPINIONS ON THE USE OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY ENDUSERS

QUESTION	SUMMARY OF RESPONSES
12. What are your opinions about reading on screen?	Favorable -- faster, convenient, save time, know contents instantly. Unfavorable -- do not like to read on screen, prefer to read text in print, need hard copies for records, hard for eyes, worry about costs, expensive.
19. What are the advantages of using online databases?	a. Quick, easy and convenient to search; saving time and effort. b. Comprehensive and broad coverage of information; indexing journals not indexed in print sources. c. Current and updated; efficient and relatively low cost; you pay as you use it. d. Capability of Boolean search; searching can be exhaustive, defined, or manipulated; complex subjects and varicus years of information can be searched by one command. e. Capability of remote access; accessible when libraries are closed. f. Availability of printouts; reducing errors of transcription. g. Accurate; well organized; having abstracts. h. Can be searched with various access points; easier to eliminate irrelevant references. i. No one can tear out pages.
20. What are the disadvantages of using online databases?	a. High cost. b. Inaccuracy of citations -- false drops or irrelevant references. c. Not as easy and friendly to use as print sources -- variations in descriptors and searching protocols of various databases, complexity of searching operations, etc. d. Requiring specific skills and knowledge -- the Boolean theory, subject specialties, choice of correct keywords or terms, etc. e. Inconvenient -- need user ID and password to access databases, must go to a library to do searching, need a librarian to help. f. Omissions in coverage -- lack of retrospective information, not well developed particularly in social sciences and humanities. g. Actual time to receive cited materials not as fast as expected -- waiting for an appointment to do searches; searches need to be processed, refined, and recycled; and waiting for interlibrary loans or off-line printouts to come.

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h Unavailability of many cited materials in local libraries; cost more for off-line printouts.
i. Lack of descriptors for many databases; little training is available to users; inability to browse subject headings online; hard to browse on screen.
j. Not all databases are updated; many duplications of sources; too narrow scope of some databases.
k. No insurance that retrieved references are comprehensive, exactly matching, and useful.
l. Possibility of downtime and lost information due to failure of power, computers, and telecommunication lines.
m. More paperwork for librarians.

25. What are the advantages of using print publications?
a. Free of charge for users; no pressure of cost for reviewing and thinking during searching.
b. Easy to use and browse; users familiar with the traditional publications; usually no help is needed; user friendly.
c. Users can have direct and immediate access at any time.
d. Comprehensive -- historical as well as updated references; covering a wide range of topics.
e. Well organized -- alphabetical order by subjects and subheadings; extensive cross references; specific headings such as criticism are provided.
f. Portable; having publishers' addresses.
g. Places for starting research.

26. What are the disadvantages of using print publications?
a. Requiring to spend much more time for searching.
b. Inconvenient to search multi-volumes, multi-editions, and scattered places.
c. Cannot do Boolean searching; may not obtain needed results.
d. Lack of cumulation and currency.
e. Not easy to match users' terms with indexing terms.
f. Involving money and time to update publications in libraries.
g. Bulky and cumbersome; have to go to libraries for searching.
h. Tedious process; hard to read and understand; users need guidance.
i. Delayed and lost publications.
j. Incompleted coverage.

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Table 5.101

EXPENDITURE FOR ELECTRONIC AND PRINT PUBLISHING IN THREE SELECTED LIBRARIES, 1982-86, REPORTED BY ADMINISTRATORS

($1,000)

	Electronic Publishing				Print Publishing			
Year	AFPL	EMUL	GSUL	Sum	AFPL	EMUL	GSUL	Sum
1982	6.00	8.00	15.00	29.00	1200.00	1208.45	1106.28	3514.73
1983	6.60	8.00	20.00	34.60	2000.00	1251.14	1453.25	4704.39
1984	6.50	10.00	40.00	56.50	2500.00	1248.57	1661.25	5409.82
1985	10.00	12.00	50.00	72.00	4000.00	1432.50	1671.22	7103.72
1986	15.00	15.00	110.00	140.00	6000.00	1550.31	1793.32	9343.63
Sum	44.10	53.00	235.00	332.10	15700.00	6690.97	7685.32	30076.29

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library
GSUL: Georgia State University Library.

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Table 5.102a

USAGE DATA OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY LIBRARIANS

(No. of Access Times)

Title (Abbreviated)	Online Publications				Print Publications			
	AFPL	EMUL	GSUL	Sum	AFPL	EMUL	GSUL	Sum
Acad Ameri Ency	10	0	0	10	0	70	0	70
Ameri: Hist & Life	8	10	3	21	0	150	10	160
Biog Index	3	2	0	5	10	100	20	130
Books in Print	0	2	0	2	40	300	10	350
Chemical Abstracts	0	0	3	3	10	0	0	10
Dissertation Abst.	15	4	25	44	0	60	30	90
Everyman's Ency	0	0	0	0	0	0	0	0
Harvard Bus Review	0	0	0	0	15	300	0	315
Science Cit Index	0	0	3	3	15	0	2	17
Soc Sci Cit Index	15	0	15	30	20	125	25	170
Sum	51	18	49	118	110	1105	97	1312

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.

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Table 5.102b

USAGE DATA OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES, REPORTED BY ENDUSERS

(No. OF Access Times)

Title(Abbreviated)	Online Publications				Print Publications			
	AFPL	EMUL	GSUL	Sum	AFPL	EMUL	GSUL	Sum
Acad Ameri Ency	0	0	0	0	59	7	3	69
Ameri: Hist & Life	3	1	2	6	2	3	3	8
Biog Index	5	0	3	8	3	4	9	16
Books in Print	1	0	8	9	42	7	24	73
Chemical Abstracts	3	0	0	3	17	0	0	17
Dissertation Abst	7	16	17	40	34	33	14	81
Everyman's Ency	0	0	0	0	0	0	0	0
Harvard Bus Review	0	0	0	0	10	0	4	14
Science Cit Index	3	0	10	13	1	0	12	13
Soc Sci Cit Index	8	2	21	31	2	19	28	49
Sum	30	19	61	110	170	73	97	340

AFPL: Atlanta-Fulton Public Library.
EUML: Emory University Library.
GSUL: Georgia State University Library.

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Table 5.201

EXPENDITURE FOR ELECTRONIC PUBLISHING IN THREE SELECTED LIBRARIES, 1982-86, REPORTED BY ADMINISTRATORS

($1,000)

Year	Atlanta-Fulton Public Library	Emory University Library	Georgia State University Library
1982	6.00	8.00	15.00
1983	6.60	8.00	20.00
1984	6.50	10.00	40.00
1985	10.00	12.00	50.00
1986	15.00	15.00	110.00
Sum	44.10	53.00	235.00

Table 5.202

EXPENDITURE FOR PRINT PUBLISHING IN THREE SELECTED LIBRARIES 1982-86, REPORTED BY ADMINISTRATORS

($1,000)

Year	Atlanta-Fulton Public Library	Emory University Library	Georgia State University Library
1982	1200.00	1208.45	1106.28
1983	2000.00	1251.14	1453.25
1984	2500.00	1248.57	1661.25
1985	4000.00	1432.50	1671.22
1986	6000.00	1550.31	1793.32
Sum	15700.00	6690.97	7685.32

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Table 5.203a

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY DATABASE, REPORTED BY LIBRARIANS

(No. of Access Times)

Library	DB1	DB2	DB3	DB4	DB5	DB6	DB7	DB8	DB9	B10
AFPL	10	8	3	0	0	15	0	0	0	15
EMUL	0	10	2	2	0	4	0	0	0	0
GSUL	0	3	0	0	3	25	0	0	3	15
Sum	10	21	5	2	3	44	0	0	3	30

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.
DB: Database.
1: Academic American Encyclopedia.
2: America: History & Life.
3: Biography Master Index.
4: Books in Print.
5: CA Search.
6: Dissertation Abstracts Online.
7: Everyman's Encyclopedia.
8: Harvard Business Review.
9: Scisearch.
10: Social Scisearch.

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Table 5.203b

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY DATABASE, REPORTED BY ENDUSERS

(No. of Access Times)

Library	DB1	DB2	DB3	DB4	DB5	DB6	DB7	DB8	DB9	DB10
AFPL	0	3	5	1	3	7	0	0	3	8
EMUL	0	1	0	0	0	16	0	0	0	2
GSUL	0	2	3	8	0	17	0	0	10	21
Sum	0	6	8	9	3	40	0	0	13	31

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.
DB: Database.
1: Academic American Encyclopedia.
2: America: History & Life.
3: Biography Master Index.
4: Books in Print.
5: CA Search.
6: Dissertation Abstracts Online.
7: Everyman's Encyclopedia.
8: Harvard Business Review.
9: Scisearch.
10: Social Scisearch.

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Table 5.204a

USAGE DATA OF SELECTED ONLINE FULL-TEXT AND REFERENCE DATABASES IN THREE SELECTED LIBRARIES, REPORTED BY LIBRARIANS

(No. of Access Times)

Library	Full-Text					Reference				
	DB1	DB2	DB7	DB8	Sum	DB3	DB5	DB9	DB10	Sum
AFPL	10	8	0	0	18	3	0	0	15	18
EMUL	0	10	0	0	10	2	0	0	0	2
GSUL	0	3	0	0	3	0	3	3	15	21
Sum	10	21	0	0	31	5	3	3	30	41

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.
DB: Database.
1: Academic American Encyclopedia.
2: America: History & Life.
3: Biography Master Index.
5: CA Search.
7: Everyman's Encyclopedia.
8: Harvard Business Review.
9: Scisearch.
10: Social Scisearch.

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Table 5.204b

USAGE DATA OF SELECTED ONLINE FULL-TEXT AND REFERENCE DATABASES IN THREE SELECTED LIBRARIES, REPORTED BY ENDUSERS

(No. of Access Times)

Library	Full-Text					Reference				
	DB1	DB2	DB7	DB8	Sum	DB3	DB5	DB9	DB10	Sum
AFPL	0	3	0	0	3	5	3	3	8	19
EMUL	0	1	0	0	1	0	0	0	2	2
GSUL	0	2	0	0	2	3	0	10	21	34
Sum	0	6	0	0	6	8	3	13	31	55

AFPL: Atlanta-Fulton Public Library.
EMUL: Emory University Library.
GSUL: Georgia State University Library.
DB: Database.
1: Academic American Encyclopedia.
2: America: History & Life.
3: Biography Master Index.
5: CA Search.
7: Everyman's Encyclopedia.
8: Harvard Business Review.
9: Scisearch.
10: Social Scisearch.

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Table 5.205a

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY AGE, REPORTED BY LIBRARIANS

(No. of Access Times*)

Databases	- 20	21 - 35	36 - 55	56 -
Acad Ameri Ency	2.80	4.20	2.80	.20
Ameri: Hist & Life	5.88	8.82	5.88	.42
Biog Master Index	1.40	2.10	1.40	.10
Books in Print	.56	.84	.56	.04
CA Search	.84	1.26	.84	.06
Dissert Abst Online	12.32	18.48	12.32	.88
Everyman's Ency	0	0	0	0
Harvard Bus Review	0	0	0	0
Scisearch	.84	1.26	.84	.06
Social Scisearch	8.40	12.60	8.40	.60
Sum	33.04	49.56	33.04	2.36

* These figures are derived from the total number of access times to online databases shown in Table 5.102a multiplying the average percentage of uses by each age group reported in Table 5.004.

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Table 5.205b

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY AGE, REPORTED BY ENDUSERS

(No. of Access Times)

Database (Abbreviated)	- 20	21 - 35	36 - 55
Acad Ameri Ency	0	0	0
Ameri: Hist & Life	1	1	4
Biog Master Index	0	4	4
Books in Print	0	1	8
CA Search	0	2	1
Dissert Abst Online	1	13	26
Everyman's Ency	0	0	0
Harvard Bus Review	0	0	0
Scisearch	0	8	5
Social Scisearch	0	11	20
Sum	2	40	68

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Table 5.206a

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY EDUCATION LEVEL, REPORTED BY LIBRARIANS

(No. of Access Times*)

Database	- High School	College	Graduate -
Acad Ameri Ency	.30	4.30	5.40
Ameri: Hist & Life	.63	9.03	11.34
Biog Master Index	.15	2.15	2.70
Books in Print	.06	.86	1.08
CA Search	.09	1.29	1.62
Dissert Abst Online	1.32	18.92	23.76
Everyman's Ency	0	0	0
Harvard Bus Review	0	0	0
Scisearch	.09	1.29	1.62
Social Scisearch	.90	12.90	16.20
Sum	3.54	50.74	63.72

* These figures are derived from the total number of access times to online databases shown in Table 5.102a multiplying the average percentage of uses by each education level reported in Table 5.004.

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Table 5.206b

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY EDUCATION LEVEL, REPORTED BY ENDUSERS

(No. of Access Times)

Database (Abbreviated)	College	Graduate
Acad Ameri Ency	0	0
Ameri: Hist & Life	1	5
Biog Master Index	0	8
Books in Print	0	9
CA Search	0	3
Dissert Abst Online	1	39
Everyman's Ency	0	0
Harvard Bus Review	0	0
Scisearch	0	13
Social Scisearch	0	31
Sum	2	108

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Table 5.207a

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY OCCUPATION, REPORTED BY LIBRARIANS

(No. of Access Times*)

Database	Faculty	Professional	Student	Other
Acad Ameri Ency	2.60	1.10	6.20	.10
Ameri: Hist & Life	5.46	2.31	13.02	.21
Biog Master Index	1.30	.55	3.10	.05
Books in print	.52	.22	1.24	.02
CA Search	.78	.33	1.86	.03
Dissert Abst Online	11.44	4.84	27.28	.44
Everyman's Ency	0	0	0	0
Harvard Bus Review	0	0	0	0
Scisearch	.78	.33	1.86	.03
Social Scisearch	7.80	3.30	18.60	.30
Sum	30.68	12.98	73.16	1.18

*These figures are derived from the total number of access times to online databases shown in Table 5.102a multiplying by the average percentage of uses of each occupation reported in Table 5.004.

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Table 5.207b

USAGE DATA OF SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY OCCUPATION, REPORTED BY ENDUSERS

(No. of Access Times)

Database (Abbreviated)	LI	FD	FM	FU	FG	DS	MS	US
Acad Ameri Ency	0	0	0	0	0	0	0	0
Ameri: Hist & Life	1	0	0	0	0	3	1	1
Biog Master Index	3	0	0	0	0	5	0	0
Books in Print	0	0	0	0	0	9	0	0
CA Search	0	2	1	0	0	0	0	0
Dissert Abst Online	2	0	0	6	2	19	10	1
Everyman's Ency	0	0	0	0	0	0	0	0
Harvard Bus Review	0	0	0	0	0	0	0	0
Scisearch	0	0	0	0	0	10	3	0
Social Scisearch	1	0	0	6	0	17	7	0
Sum	7	2	1	12	2	63	21	2

LI: librarian.
FD: faculty teaching doctoral students.
FM: faculty teaching master's students.
FU: faculty teaching undergraduate students.
FG: faculty teaching grade 1-12 students.
DS: doctoral students including 1 in post doctoral studies; 3 librarians; 3 in 6-year specialist programs, 1 of them is a librarian.
MS: master's students including 2 in library science.
US: undergraduate students.

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Table 5.208

USERS' SATISFACTION WITH SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY AGE, REPORTED BY ENDUSERS

0: complete dissatisfaction
9: Complete satisfaction

- 20		21 - 35		36 - 55	
Subject	Satisf Rate	Subject	Satisf Rate	Subject	Satisf Rate
S101	7	S201	2	S301	6
S102	6	S202	6	S302	7
S103	3	S203	8	S303	5
S104	8	S204	7	S304	6
S105	2	S205	6	S305	7
		S206	7	S306	6
		S207	5	S307	7
		S208	4	S308	6
		S209	8	S309	4
		S210	8	S310	5
		S211	8	S311	6
				S312	7
				S313	6
				S314	8
Sum	= 26	Sum	= 69	Sum	= 86
n_1	= 5	n_2	= 11	n_3	= 14
$\bar{A}_1 = 26 / 5$	= 5.20	$\bar{A}_2 = 69 / 11$	= 6.27	$\bar{A}_3 = 86 / 14$	= 6.14

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Table 5.209

USERS' SATISFACTION WITH SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY EDUCATION LEVEL, REPORTED BY ENDUSERS

0: complete dissatisfaction
9: complete satisfaction

With College Education		With Master's Education		With Doctoral Education	
Subject	Satisf Rate	Subject	Satisf Rate	Subject	Satisf Rate
S101	7	S201	4	S301	6
S102	6	S202	5	S302	5
S103	3	S203	6	S303	6
S104	8	S204	7	S304	5
S105	2	S205	7	S305	7
		S206	6	S306	4
		S207	7	S307	2
		S208	6	S308	6
		S209	8	S309	8
		S210	7	S310	7
				S311	6
				S312	8
				S313	8
				S314	6
				S315	8
Sum	= 26	Sum	= 63	Sum	= 92
n_1	= 5	n_2	= 10	n_3	= 15
$\bar{A}_1 = 26 / 5$	= 5.20	$\bar{A}_2 = 63 / 10$	= 6.30	$\bar{A}_3 = 92 / 15$	= 6.13

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Table 5.210

USERS' SATISFACTION WITH SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES BY OCCUPATION, REPORTED BY ENDUSERS

0: complete dissatisfaction
9: Complete satisfaction

Faculty & Professional		Student	
Subject	Satisf Rate	Subject	Satisf Rate
S101	7	S201	2
S102	6	S202	8
S103	7	S203	3
S104	6	S204	6
S105	6	S205	7
S106	2	S206	4
S107	5	S207	5
S108	7	S208	7
S109	6	S209	6
		S210	7
		S211	6
		S212	8
		S213	5
		S214	4
		S215	6
		S216	8
		S217	7
		S218	6
		S219	8
		S220	8
		S221	8
Sum	= 52	Sum	= 129
n_1	= 9	n_2	= 21
$\bar{A}_1 = 52 / 9$	= 5.78	$\bar{A}_2 = 129 / 21$	= 6.14

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Chapter Six

DATA ANALYSES

Analyses and Statistical Tools

In accordance with the null hypotheses stated in Chapter Four, two major analyses were involved in the present study. One was the correlation analysis to examine the two main hypotheses; i. e., the relationship between the two sets of variables representing electronic and print publishing. The other was the analysis of variances to examine the related null hypotheses; i. e., the differences among the various sets of factors within each study group.

Because of the nature of data presented in the previous chapter, the Pearson r was applied to test the main null hypotheses, and the analysis of variance for one factor (ANOVA, oneway), to evaluate each related null hyothesis. However, the t-test, paired or independent, was administered in lieu of the ANOVA when only two columns of comparison data were collected because no third group had participated in the survey conducted earlier. Along with the Pear-

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son r, bivariate scattergrams were plotted to display the correlations between the variables under investigation.

Following the ANOVA, two range tests, Tukey-HSD and Scheffe procedure, were also applied to examine where a difference occurred if the result of ANOVA was significant. The computer program SPSS-x was used to do statistical operations. For evaluating the results of the analyses in this study, the level of significance, the alpha, was set at .05.

Results of Analyses

The results of the Pearson r, ANOVA, t-test, and other additional analyses along with their SPSS-x programs are appended in Appendix 6.A101 through 6.A210. For the purpose of verifying, the number used in these appendices is matched with the order of datum tables presented in Chapter Five; i. e., the appendices numbered 100s are the analyses for testing main null hypotheses; and 200s, for examining related null hypotheses. The titles of these analyses are listed below:

Appendix 6.A101, Analysis of Correlation between Expenditure for Electronic and Print Publishing in Three Selected Libraries, 1982-1986.

Appendix 6.A102a, Anaysis of Correlation between Usage of Selected Online and Print Publications in Three Selected Libraries, Data Reported by Librarians.

Appendix 6.A102b, Analysis of Correlation between Usage of Selected Online and Print Publications in Three Selected

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Libraries, Data Reported by Endusers.

Appendix 6.A201, Analysis of Variance of Expenditure for Electronic Publishing among Three Selected Libraries, 1982-86.

Appendix 6.A202, Analysis of Variance of Expenditure for Print Publishing among Three Selected Libraries, 1982-86.

Appendix 6.A203a, Analysis of Variance of Usage among Ten Selected Online Databases in Three Selected Libraries, Data Reported by Librarians.

Appendix 6.A203b, Analysis of Variance of Usage among Ten Selected Online Databases in Three Selected Libraries, Data Reported by Endusers.

Appendix 6.A204a, Analysis of Variance of Usage between Selected Full-Text and Reference Online Databases in Three Selected Libraries, Data Reported by Librarians.

Appendix 6.A204b, Analysis of Variance of Usage between Selected Full-Text and Reference Online Databases in Three Selected Libraries, Data Reported by Endusers.

Appendix 6.A205a, Analysis of Variance of Online Database Usage among Various Age Groups of Users in Three Selected Libraries, Data Reported by Librarians.

Appendix 6.A205b, Analysis of Variance of Online Database Usage among Various Age Groups of Users in Three Selected Libraries, Data Reported by Endusers.

Appendix 6.A206a, Analysis of Variance of Online Database Usage among Various Educational Levels of Users in Three Selected Libraries, Data Reported by Librarians.

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Appendix 6.A206b, Analysis of Variance of Online Database Usage among Various Educational Levels of Users in Three Selected Libraries, Data Reported by Endusers.

Appendix 6.A207a, Analysis of Variance of Online Database Usage among Various Occupations of Users in Three Selected Libraries, Data Reported by Librarians.

Appendix 6.A207b, Analysis of Variance of Online Database Usage among Various Occupations of Users in Three Selected Libraries, Data Reported by Endusers.

Appendix 6.A208, Analysis of Variance of Users' Satisfaction with Selected Online Databases among Various Age Groups of Users in Three Selected Libraries.

Appendix 6.A209, Analysis of Variance of Users' Satisfaction with Selected Online Databases among Various Educational Levels of Users in Three Selected Libraries.

Appendix 6.A210, Analysis of Variance of Users' Satisfaction with Selected Online Databases between Two Occupational Groups of Users in Three Selected Libraries.

From the above appendices, the obtained results are selected and arranged in two tables. Table 6.100 is the summarized result of analyses of correlation between two sets of variables representing electronic and print publishing. Table 6.200 is the summarized result of analyses of variances among variables within each study group. Again, in Table 6.200, the results are arranged following the order of the stated null hypotheses. The following are the two tables:

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Table 6.100

SUMMARY RESULT OF ANALYSES OF CORRELATION BETWEEN ELECTRONIC AND PRINT PUBLISHING

Var	Expenditure				Usage 1				Usage 2			
	EP1	EP2	EP3	EP4	EP1	EP2	EP3	EP4	EP1	EP2	EP3	EP4
PP1	.98*	~	~	~	-.32	~	~	~	-.25	~	~	~
PP2	~	.97*	~	~	~	.17	~	~	~	.89*	~	~
PP3	~	~	.77*	~	~	~	.79*	~	~	~	.85*	~
PP4	~	~	~	.97*	~	~	~	.06	~	~	~	.55

Usage 1: data reported by librarians.
Usage 2: data reported by endusers.
EP1: electronic publishing, AFPL.
EP2: electronic publishing, EMUL.
EP3: electronic publishing, GSUL.
EP4: electronic publishing, sum.
PP1: print publishing, AFPL.
PP2: print publishing, EMUL.
PP3: print publishing, GSUL.
PP4: print publishing, sum.
*p < .05.

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Table 6.200

SUMMARY RESULT OF ANALYSES OF VARIANCE AMONG VARIABLES WITHIN EACH STUDY GROUP

Analysis Test	F Ratio (t value)	F (t) Probability = .05	Signi-ficance	Significant (*)
1. Variance of expenditure for electronic publishing among three libraries:				
$ANOVA_{2,12}$	4.74	.03	$p < .05$	*
Tukey-HSD	AFPL and GSUL are significantly different			*
Scheffe	No two libraries are significantly different.			
2. Variance of expenditure for print publishing among three libraries:				
$ANOVA_{2,12}$	3.96	.05	$p < .05$	*
Tukey-HSD	No two libraries are significantly different.			
Scheffe	No two libraries are significantly different.			
3a. Variance of usage among selected databases (data from librarians):				
$ANOVA_{9,20}$	3.12	.02	$p < .05$	*
Tukey-HSD	DB7 and DB8 are significantly different from DB6.			*
Scheffe	No two databases are significantly different.			
3b. Variance of usage among selected databases (data from endusers):				
$ANOVA_{9,20}$	3.51	.01	$p < .05$	*
Tukey-HSD	DB1, 7, 8, and 5 are significantly different from DB6.			*
Scheffe	No two databases are significantly different.			
4a. Variance of usage between full-text and reference databases (data from librarians):				
$t\text{-test}_2$ (paired)	- .43	.71	$p > .05$	

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4b. Variance of usage between full-text and reference databases (data from endusers):

t-test$_2$ (paired)	-1.82	.21	p > .05	

5a. Variance of database usage among age-groups (data from librarians):

ANOVA$_{3,36}$	2.06	.12	p > .05	
Tukey-HSD	No two age-groups are significantly different.			
Scheffe	No two age-groups are significantly different.			

5b. Variance of database usage among age-groups (data from endusers):

ANOVA$_{2,27}$	3.11	.06	p > .05	
Tukey-HSD	The 20-and-younger age-group is different from 36 - 55 age-group.			*
Scheffe	No two age-goups are significantly different.			

6a. Variance of database usage among educational levels (data from librarians):

ANOVA$_{2,27}$	2.79	.08	p > .05	
Tukey-HSD	No two educational levels are significantly different.			
Scheffe	No two educational levels are significantly different.			

6b. Variance of database usage between two educational levels (data from endusers):

t-test$_9$ (paired)	-2.50	.03	p < .05	*

7a. Variance of database usage among occupational groups (data from librarians):

ANOVA$_{3,36}$	3.80	.02	p < .05	*
Tukey-HSD	Other-occupation group is significantly different from student group.			*
Scheffe	Other-occupation group is significantly different from student group.			*

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7b. Variance of database usage among occupational groups (data from endusers):

$ANOVA_{7,72}$	4.83	.00	$p < .05$	*
Tukey-HSD	Most occupation groups are different from doctoral student group.			*
Scheffe	Most occupation groups are different from doctoral student group.			*

8. Variance of satisfaction with online information among age-groups:

$ANOVA_{2,27}$	.73	.49	$p > .05$
Tukey-HSD	No two-age groups are significantly different.		
Scheffe	No two-age groups are significantly different.		

9. Variance of satisfaction with online information among educational levels:

$ANOVA_{2,27}$	.74	.49	$p > .05$
Tukey-HSD	No two educational levels are significantly different.		
Scheffe	No two educational levels are significantly different.		

10. Variance of satisfaction with online information between two occupations:

$t\text{-test}_{28}$ (independent)	-.54	.60	$p > .05$

AFPL: Atlanta-Fulton Public Library.
GSUL: Georgia State University Library.
DB: Database.
1: Academic American Encyclopedia.
5: CA Search.
6: Dissertation Abstracts Online.
7: Everyman's Encyclopedia.
8: Harvard Business Review.

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Interpretation

In table 6.100, three categories, with a total of 12 pairs, of correlations are included. Of these, four correlation coefficients are less than .50. These results indicate a weak relationship between these pairs of variables. Eight correlation coefficients are higher than .50, which implies at least a moderately strong correlation between the two variables in question.

Among the eight variable pairs with correlation coefficients higher than .50 in the table, seven (those marked with an *) show significant correlations with an alpha of .05, the level set for this study. Nevertheless, these seven correlation coefficients are all positive. That is,

If $p < .05$,

then $r > 0$.

The outcome indicates that not confirmed are both

the research hypotheses H_{1101}: $r_{101} < 0$ (expenditure);

H_{1102}: $r_{102} < 0$ (usage),

and the null hypotheses H_{0101}: $r_{101} = 0$ (expenditure);

H_{0102}: $r_{102} = 0$ (usage).

The rejection of the null hypotheses infers that the correlations between these pairs of variables under investigation are statistically significant. The rejection of the research hypotheses, on the other hand, suggests that these correlations are in reverse direction; i. e., they are not negative but positive. The probability of significance of the remaining five pairs of variables in the table is greater than an alpha of .05 ($p > .05$). Thus the null hypotheses

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for these pairs of variables are retained.

In re-examining the results shown in table 6.100, it is evident that the expenditure on electronic publishing in each library in the study (EP1, EP2, EP3) and its total (EP4) yielded extremely high correlation coefficients (three of them almost equaling to 1) with the expenditure spent on print publishing in each of these libraries (PP1, PP2, PP3) and its total (PP4). In further examining the data presented in table 5.101 in Chapter Five and the bivariate scattergrams shown in appendix 6.A101, it is also evident that the correlation of the expenditure between the two publishing groups in the study is positive. In other words, the expenditure spent on print publishing in each selected library, and as a total, was positively associated with that spent on electronic publishing during the years covered in the study.

Similarly, three subsets of variables pertaining to usage in table 6.100 also show high and significant correlations between the usage of the two publishing groups (EP3 with PP3 in usage 1; EP2 with PP2, and EP3 with PP3 in usage 2). These results also indicate a positive association of the usage of print publications with that of electronic publishing in the three libraries. On the other hand, again shown in the same table, the correlations between the total usage of the two products are either very low (correlation coefficient is .06 in usage 1 with data reported by librarians), or statistically nonsignificant ($p > .05$ in usage 2 with data reported by endusers). These results are interpreted as that, in total, the usage of print materials was not associated with that of electronic publishing in the selected libraries during the period included in

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the study.

Table 6.200 contains the result of a total of 15 analyses of variances. It also carries the results from two range tests, which will be examined when needed. Of the 15 analyses, seven (those marked with *) obtained an F (or t) probability less than an alpha of .05. That is,

$$\text{if} \quad p < .05,$$

$$\text{then} \quad \bar{A}_1 \neq \bar{A}_2 \neq \ldots.$$

The results imply the confirmation of these research hypotheses:

$$H_{1201}: \quad \bar{A}_{2011} \neq \bar{A}_{2012} \neq \ldots.$$

$$H_{1202}: \quad \bar{A}_{2021} \neq \bar{A}_{2022} \neq \ldots.$$

$$H_{1203a}: \quad \bar{A}_{203a1} \neq \bar{A}_{203a2} \neq \ldots.$$

$$H_{1203b}: \quad \bar{A}_{203b1} \neq \bar{A}_{203b2} \neq \ldots.$$

$$H_{1206b}: \quad \bar{A}_{206b1} \neq \bar{A}_{206b2} \neq \ldots.$$

$$H_{1207a}: \quad \bar{A}_{207a1} \neq \bar{A}_{207a2} \neq \ldots.$$

$$H_{1207b}: \quad \bar{A}_{207b1} \neq \bar{A}_{207b2} \neq \ldots.$$

They also imply the rejection of these null hypotheses:

$$H_{0201}: \quad \bar{A}_{2011} = \bar{A}_{2012} = \ldots.$$

$$H_{0202}: \quad \bar{A}_{2021} = \bar{A}_{2022} = \ldots.$$

$$H_{0203a}: \quad \bar{A}_{203a1} = \bar{A}_{203b2} = \ldots.$$

$$H_{0203b}: \quad \bar{A}_{203b1} = \bar{A}_{203b2} = \ldots.$$

$$H_{0206b}: \quad \bar{A}_{206b1} = \bar{A}_{206b2} = \ldots.$$

$$H_{0207a}: \quad \bar{A}_{207a1} = \bar{A}_{207a2} = \ldots.$$

$$H_{0207b}: \quad \bar{A}_{207b1} = \bar{A}_{207b2} = \ldots.$$

In other words, of these seven analyses, the results suggest that statistically significant differences are found among the variables

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in question. The remaining eight analyses show in table 6.200 an F (or t) probability higher than an alpha of .05; i. e., p > .05. The outcomes denote that no statistically significant difference is attained among the variables in each of these eight analyses. As shown in table 6.200, the seven analyses having significant differences among the variables under study are:

(a) Analysis 201, variance of expenditure for electronic publishing among three selected libraries.

(b) Analysis 202, variance of expenditure for print publishing among three selected libraies.

(c) Analysis 203a, variance of usage among selected online databases in the selected libraries with data reported by librarians.

(d) Analysis 203b, variance of usage among selected online databases in the selected libraries with data reported by endusers.

(e) Analysis 206b, variance of online database usage between two educational levels of users in the selected libraries with data reported by endusers.

(f) Analysis 207a, variance of online database usage among various occupations of users in the selected libraries with data reported by librarians.

(g) Analysis 207b, variance of online database usage among various occupations of users in the selected libraries with data reported by endusers.

The perusal of the group means of various factors presented in appendix 6.A200's and the results of range tests recorded in table 6.200's reveals that these differences are particularly salient:

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(a) The expenditure for electronic publishing in AFPL from that in GSUL.

(b) The usage of Academic American Encyclopedia, CA Search, Everyman's Encyclopedia, and Harvard Business Review from that of Dissertation Abstracts Online.

(c) Online database usage by most occupational groups from that by the student group.

In further examination of raw data recorded in Table 5.200's, it is noted that Everyman's Encyclopedia and Harvard Business Review, two full-text databases, were not used at all, and Academic American Encyclopedia and CA Search were infrequently used in this study. According to the data, Dissertation Abstracts Online was the most used online database. It is also noted that demographically, the 21 - 35 age group and graduate students were the most frequent users of online databases in the study. High school students and the 20 and younger age-group were found not active in online usage.

It appears in Table 6.200 that the usage of online full-text databases was not different from that of online reference databases. Also shown in the table, the satisfaction of online users with online information in the study was found not significantly different with their age, educational backgrounds, and occupations. In addition, the data in Table 5.208 through 5.210 reported in Chapter Five indicate that these users were at least moderately satisfied with online information (5.20 - 6.30 average on a 0 - 9 evaluation scale).

The results of the analyses of variance demonstrate that most categories of data collected from endusers are consistent

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with those reported by librarians; i. e., while the analyses of the former data are significant, so are the analyses of the latter. The reverse is also true. This verification may provide a positive value on the reliability of the results of these analyses. One exception is the analysis of online database usage among various educational backgrounds of users with data reported by the two different sources (analysis 206a and 206b). In reviewing Table 5.206b (with data from endusers) reported in Chapter Five, it is found that only two columns of data were recorded: "college" and "graduate". And there are only two usages under the "college" level, while the great majority of usage is under the "graduate" column. While in Table 5.206a (with data from librarians), data are broken into three groups with the closer number of usage between the "college" and "graduate" levels. This discrepancy may cause the contradictory results of analysis of the two different sources of data.

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Chapter Seven

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Summary

The work was designed as a case study in response to the claim made by Lancaster, Thompson, and others that electronic publishing will replace print publishing, and libraries will be disembodied by the year 2000.[1,2] The problem is: will the prediction actually come true? After the research problem is raised, the objectives and significance of the study are introduced, the terms used in, and the scope of, the study defined.

Two chapters of literature review follow. One describes the significant landmarks, categorization, and issues of electronic publishing. The other reviews Lancaster and his associates' replacement theory and their opponents' coexistence theory on the relationship between the two publishing establishments. Brief comments are made on the two theories. Following the review is the conceptual framework of the study, where research assumptions, questions, hypotheses, and null hypotheses are developed.

Three libraries located in Atlanta, Georgia were selected for the study. The expenditure for, and the usage of, the two forms

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of publishing in the three libraries were taken to examine whether or not electronic publishing has had a real impact on print publishing. For obtaining usage data, ten online databases with parallel publishing in print were chosen from the Dialog Database Catalog. The administrators, reference librarians, and ten endusers in each of the selected libraries were involved. Three interview questionnaires were devised for collecting data. The data were then arranged in 24 tables. Minor problems were encountered during the survey.

Two major analyses were employed in the study: Correlation and variance analyses. For the former, the Pearson r was applied; for the latter, the ANOVA or t-test was used. In addition, two range tests were also administered. The program SPSS-x was used to do computing operations. The results of these analyses were then sorted, organized, and interpreted.

Discussion

Many viewpoints promoting "gone with" print[3] have been counterbalanced in Chapter Three. This section will not repeat the pros and cons already covered. From the review presented in Chapter Two and Three, and from the development of recent innovations, it seems that technologically, it is now less problematic than years ago to replace print publishing with electronic publishing.

This fact is recognized by the respondents, librarians and endusers, involved in the present study. The surveys result summarized in Table 5.002 and 5.006 in Chapter Five show that they are aware of the many advantages of using online databases, the vari-

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ables representing electronic publishing. They point out that online searching is faster, having Boolean operation capability, more updated information, etc.

Many other data summarized in Chapter Five also demonstrate the optimistic opportunities for electronic publishing. In Table 5.001, the administrators of the selected libraries report that, in the next ten years, their budgets will probably increase 10 - 29 % annually for online services. In Table 5.003, data show that the reference librarians participating in the study project at least moderately increasing funds for online searches in their libraries from 1988 through 1992. In addition, Table 5.005 displays the data that a majority of endusers (22 of 30) are interested in actually doing online searches themselves. In the same table, data indicate that most endusers will continue to use online services even if they themselves have to pay the current rate of online retrieval charges.

Furthermore, the results of several analyses presented in Chapter Six also favor of the position supporting electronic publishing. As reported, no difference was found between the usage of online full-text and that of online reference databases. The difference in satisfaction with online information among different age, educational, and occupational groups of users was found not statistically significant. These results indicate that online full-text and reference databases may be evenly used by users, and online information may equally satisfy the demographic groups of users surveyed. It seems that the recognized advantages of technology, the possibility of future funds, and the indicated even usage of online

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databases are strong evidence to support Lancaster's position that electronic publishing will replace print publishing, and, in turn, libraries will be displaced by the year 2000.[4]

On the contrary, when reviewing the data summarized in Chapter Five again, it is also found that librarians and endusers point out at the same time many disadvantages of electronic publishing and many merits of print publishing. The argument on the advantages and disadvantages of the two forms of publishing is actually recycling the debate found in many publications[5,6] and reviewed in Chapter Three of the present study. As for the possible future funds, the administrators report, in Table 5.001, similar increase rates for print materials and for online systems.

It is noted in Table 5.101 that the reported amount of the past budget for electronic publishing is only a tiny figure in comparison with the large amount of the budgets for print materials in the selected libraries. This fact suggests that when the annual rate of increase in the budgets for the two publishing groups is similar, print materials will then have larger and larger amounts of the budgets, and in comparison, online budgets will become smaller and smaller. And the fact is that, as recorded in Table 5.001, the selected libraries did have a projection of similar annual increase rates (10 - 29 %) for the two publishing forms in the next ten years. Moreover, also seen in Table 5.001, the possibility is very low (only GSUL' data show the possibility) that, in the next ten years, the surveyed libraries would reallocate their book budget to support online services. These data are in contradiction of the anticipation of such a reallocation made by Lancaster and his coauthors.[7]

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Further reviewing data in Table 5.002 and 5.005 reported by librarians and endusers, several critical points are identified to be in contrast with the process of electronic evolution. These points are particularly inconsistent with Lancaster's projection that many non-library professionals would begin to perform online searches themselves.[8] Some examples are:

(a) No enduser was able to have access to a terminal in the selected libraries to do online searches themselves.

(b) The most important role of librarians was still considered to be as intermediaries to do searching for endusers.

(c) Most online searches in the selected libraries were performed by librarians, while most searches in print form were done by endusers themselves.

Moreover, as reported in Chapter Six, the online users in the present study clustered around the 21 - 35 age group and around graduate students. They were not high school students, or the "younger generation, growing up with a diet of computers and electronic games." As Lancaster expected, the younger generation would speed up the electronic revolution.[9]

Many findings reported in Chapter Six also contradict the viewpoints of replacement theory. For example, the finding of positive correlation between the expenditure for electronic and print publishing is in contrast with the previously stated assumption of negative correlation between the development of the two publishing enterprises. The findings of low and nonsignificant correlations between the usage of the two groups of publishing are inharmonious with the same assumption of negative correlation. The

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assumption was drawn based on Lancaster and his associates' replacement theory.[10,11]

On the other hand, much evidence is in agreement with the opposing view that electronic publishing will not replace print publishing, which is "here to stay."[12] For instance, data in the above mentioned tables reveal that printouts were often (80 - 100 %) requested for online search results by almost all respondents in the study. The phenomenon of low or no use of full-text online databases and relatively high use of Dissertation Abstracts Online shown in Table 5.203a and 5.203b indicates that electronic publishing itself has not established an even and balanced market. This phenomenon is also consistent with the previously stated assumption that variances exist among different factors within the electronic publishing group.

Conclusions and Implications

Based on the literature related to electronic publishing reviewed in Chapter Two, the opinions on the possible impact of electronic publishing on print publishing in Chapter Three, the data demonstrated in Chapter Five, the implications drawn from different analyses reported in Chapter Six, and the above discussion, it is reasonable to draw the following conclusions, which, in turn, lead to some ramifications for the library and information profession.

1. Specific Conclusions.

(1) The findings of the present study generally do not support Lancaster, Thompson, and others' theory that, by the year 2000,

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electronic publishing will replace print publishing, and computer terminals will displace libraries.[13,14]

(2) The findings of the study, on the other hand, coincide with the viewpoints, expressed by Lacy,[15] Galvin,[16] etc., and summarized by this writer,[17] that electronic publishing will coexist with print publishing as well as with other communication media.

2. Broad Conclusions.

(1) Computer and information technologies have been developed rapidly, particularly in recent years. New capabilities and innovations of these technologies will continue to emerge in the years to come.

(2) Libraries and information centers have widely taken advantage of the capabilities of the newly developed technologies for faster and better services. They will continue to apply many more of these new technologies to capture, store, and transfer ever-increasing data and knowledge.

(3) Because of the rapid increase of knowledge and the application of new information technologies, library and information professionals, functioning as the bridge between cumulative knowledge and information seekers, have taken and will continue to take a more and more important role in social productivity and information needs.

(4) However, because of the vastness and diversity of knowledge and special skills needed for various technical operations, the umbrella profession of librarianship will naturally need to subdivide into different specialized areas.

3. General Implications.

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(1) When planning future services, library administrators may need to continue to give a reasonable priority to the traditional services based on print publications. Print is not over, at least not in the foreseeable future.

(2) In the meantime, library administrators may also need to keep their knowledge current with the changing world of technologies. They need to be aware of the availability of new products in order to provide adequate services, which are properly balanced with components in different media formats, including electronic and print publishing.

(3) The administrators may need particularly to realize the missions of their libraries, and the characteristics of different communication media including electronic and print publications. They will need to be able to distinguish the needs of their institutions, to select the most appropriate media format, and to determine a balanced ratio of different formats for providing the best services.

(4) In education, traditional courses for librarianship such as selection, organization, and dissemination of knowledge in print on paper may need to be continuously emphasized while the services based on print publications continue to be considered important.

(5) At the same time, curricula in library schools may need to flexibly reflect the actual development of technologies in libraries. Many, if not all, students in library schools may need to acquire basic knowledge, skills, and programmming related to computer and information technologies.

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(6) In addition to broad knowledge, each library school graduate may need to have at least one area of specialization in knowledge or technology. These graduates will need to be so prepared that they may be able to meet the challenge of general as well as specialized needs in libraries. When each library school graduate is so educated, the library and information profession as a whole will then meet the diverse demands in the high-tech and information explosion society.

(7) When the library and information profession is thus diversified, individual library schools with small size of faculty and staff may not be able to provide complete curricula for educating students to meet all different needs. It is natural then that each library school may have to specialize in certain curricula to educate librarians serving in certain specialized areas.

Although the view that print publishing and libraries are doomed is not justified by this study, it is the opinion of this writer that prophecies or predictions including science fiction, classic mythologies, technological forecasts, etc. are mostly the reflections of social needs or human desires. The wordless heaven-book in Chinese folktale mentioned in Chapter Two was originated as a propaganda organ for political purposes. It has survived century after century among the Chinese because its wordless message can be altered and updated according to contemporary political needs.

Bush's memex, Nelson's hypertext, Licklider's conception of separating information from pages, Backer's Movie Manual, Spinrad's electronic university, and many other images, visions,

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or experiments, also discussed in Chapter Two, are all reflections of human minds attempting to overcome the threshold of present paper-based communication systems. The goal of these attempts is fundamentally similar to that of inventing clay tablets, papyrus, parchment, and paper in history. The cycle is simply that when human activities become extended and more complex, greater and greater volume of knowledge is yielded, greater and greater knowledge is needed for men to solve their problems, and, in turn, greater and greater capability of communication media is required to acquire, store, and transfer the increasing volume of knowledge for human needs.

When the technology of parchment could no longer serve human needs, paper was invented. Now, because "the knowledge in the world is doubling every ten years and the rate is itself increasing,"[18] another communication medium has come upon a threshold in handling knowledge for human needs. In this sense, Swift, Bush, Lancaster, mentioned in Chapter Two, and other visionaries deserve to be recognized for their foresight regarding the possible application of technological innovations to surpass the threshold of present paper-based systems. Their future visions are particularly valued in terms of the concept of new futurism stated by Dennis Gabor, the 1971 Nobel prize winner in physics:

> The future cannot be predicted, but futures can be invented.... The first step of the technological or social inventor is to visualise by an act of imagination a thing or state of things which does not yet exist and which appears to him some way desirable. He can then start rationally arguing backwards from the invention and forward from the means at his disposal, until a way is found from one to the other.[19]

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A caution must be made in reading the conclusions of the study, particularly the specific conclusions. It must be understood that these conclusions are solely based on the interpretations derived from the review, data, and analyses included in the study. Because only a few selected factors in a few selected libraries were involved, the power of the analyses covered in the study is certainly limited for generalization and interpretation. Further study involving many more factors, more libraries, and more analyses will be needed to understand better the actual impact of electronic publishing on print publishing.

Recommendations

For the above mentioned and other reasons, the following recommendations are proposed for future consideration:

1. No attempt has been made to exhaust all possible analyses for data collected in the present study. Further analysis of these data may provide new information for the issue under investigation. For example, the analysis of variance of projected funds with data reported by reference librarians for online searching among selected libraries may be worthwhile.

2. Using the collected expenditure and usage data in the study, trend analyses may also be applied to determine the rate and direction of changes, and to predict the future status,[20] of electronic and print publishing individually.

3. A two-factor design[21] may be adopted for future study to examine if there is an interaction[22] between the growth of electronic and print publishing. The data recorded in Table 5.101 and

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5.102 in Chapter Five may be used for the two-factor analysis.

4. The subjects of the survey may be widened to include randomly sampled libraries in different states, and randomly sampled databases from various online information systems in order to obtain more powerful results for generalization and interpretation.

5. The present study surveyed only online users. For ascertaining different views and opinions, non-users of online systems may be included and investigated in a future study of the subject.

6. A variety of studies involving different factors can be developed to explore the impact of electronic publishing on print publishing. For example, one simple nationwide random survey could be conducted to verify if, as Lancaster projects, "a significant number of potential library users have their own terminals in their offices, homes or both and can communicate directly with the library."[23] This survey might include the individual's time spent on reading electronic and print publishing and the contents and purpose of the reading.

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Appendix 5.A1

INTERVIEW QUESTIONS WITH ADMINISTRATORS FOR EXPENDITURE INFORMATION ON ONLINE SYSTEMS AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES

Interviewee: Position:

Library: Date Interviewed:

1. When did your library start the online service? 19_____

2. What online system(s) did your library use when you first started the online service?

3. How many online systems does your library have now? ___

4. What are their names? BRS, Dialog . . . ?

5. According to your records, such as your annual reports, or by your knowledge, what is your annual expenditure for online systems from 1982 through 1986?

1982	$ _____	1985	$ _____
1983	_____	1986	_____
1984	_____		

6. Did the expenditure include the costs for the following major purchases? If yes, please indicate the name/type of the item, the year in which your library made the purchase, and the amount of dollars:

Item	No	Year	Cost
Mini or mainframe computers	___		
_____ _____		19___	$_____
_____ _____		19___	_____
Online public catalog package	___		
_____		19___	_____
Others (specify) _____		19___	_____

7. What is your annual expenditure for print publications from

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1982 through 1986?

1982	$ _____	1985	$ _____
1983	_____	1986	_____
1984	_____		

8. What are the major items covered by this expenditure?

Books	___	Periodicals	___
Newspapers	___	Others (specify)	___

9. Please indicate below that according to your projection in the next ten years, on an average, your library budget will probably:

	for online services	for print materials
increase 30 % and more annually	___	___
increase 10 - 29 % annually	___	___
increase 1 - 9 % annually	___	___
not change	___	___
reduce 1 - 9 % annually	___	___
reduce 10 - 29 % annually	___	___
reduce 30 % and more annually	___	___

10. Please indicate below that according to your projection, in the next ten years, your library will probably reallocate

60 - 100 % of book budget to support online services ___

30 - 59 % of book budget to support online services ___

10 - 29 % of book budget to support online services ___

1 - 9 % of book budget to support online services ___

None of book budget to support online services ___

1 - 9 % of online budget to purchase print materials ___

10 - 29 % of online budget to purchase print materials ___

30 - 59 % of online budget to purchase print materials ___

60 - 100 % of online budget to purchase print materials ___

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Appendix 5.A2

INTERVIEW QUESTIONS WITH REFERENCE LIBRARIANS FOR USAGE INFORMATION OF SELECTED DATABASES AND PRINT MATERIALS IN THREE SELECTED LIBRARIES

Interviewee: Position:

Library: Date Interviewed:

1. How many years have you been in reference services? ___

2. How many years have you been in online services? ___

3. Please indicate in the following list the total number of access times to each of these databases in the past six months.

Online Databases	No. of Access Times	Online Databases	No. of Access Times
a. Academic American Encyclopedia	___	f. Dissertation Abstracts Online	___
b. America: History and Life	___	g. Everyman's Encyclopedia	___
c. Biography Master Index	___	h. Harvard Business Review	___
d. Books in Print	___	i. Scisearch	___
e. CA search	___	j. Social Scisearch	___

4. Of the total access times, please indicate below the approximate percentage of uses by each of these four age groups of users:

20 years old and younger	___ %	36 - 55	___ %
21 - 35	___ %	56 and older	___ %

5. Of the total access times, please indicate below the approximate percentage of uses by each of these three levels of education of users:

With/without high school education	___ %
With college education	___ %
With graduate education	___ %

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6. Of the total access times, please indicate below the approximate percentage of uses by each of the following occupations of users:

Faculty	___ %	Students	___ %
Professionals	___ %	Others	___ %

7. Does your library charge users for online searches?

Yes ___ No ___

8. On an average, how much does your library charge for each minute including the cost for communication line? $ ___

9. Presently, does your library have special funds to support online searches for users? If yes, please indicate the amount and the source of the fund:

Yes ___ No ___

$ _____ Source _____

10. Do you project that your library will have funds for online searches for users in the next five years? If yes, please indicate the amount and source of the fund.

Yes ___ No ___

1988	$ ____	Source _____
1989	____	_____
1990	____	_____
1991	____	_____
1992	____	_____

11. Can users have access to a terminal to do online searching themselves in your library? Yes ___ No ___

12. How often are printouts requested? For

80 - 100 % of searches	___	20 - 39 % of searches	___
60 - 79 % of searches	___	0 - 19 % of searches	___
40 - 59 % of searches	___		

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13. In your opinion, what is the most important role of a librarian in online services?

An intermediary to search information for endusers ___

An educator to teach endusers to do online searching ___

A counselor to provide advice to online users ___

An expert for database structure ___

Other (specify) _____

14. According to your experience, what are five advantages of using online databases?

a. d.

b. e.

c.

15. And what are five disadvantages?

a. d.

b. e.

c.

16. The following is a list of ten publications in print form. Please indicate in the list the total number of access times to each of these publications in the past six months:

Title of Publications	No. of Access Times	Title of Publications	No. of Access Times
a. Academic American Encyclopedia	___	f. Dissertation Abstracts	___
b. American: History and Life	___	g. Everyman's Encyclopedia	___
c. Biography Master Index	___	h. Harvard Business Review	___
d. Books in Print	___	i. Science Citation Index	___
e. Chemical Abstracts	___	j. Social Science Citation Index	___

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17. Of the total access times, please indicate below the approximate percentage of uses by each of these four age groups of users?

20 years old and younger	___ %	36 - 55	___ %
21 - 35	___ %	56 and older	___ %

18. Of the total access times, please indicate below the approximate percentage of uses by each of these three levels of education of users:

With/without high school education ___ %

With college education ___ %

With graduate education ___ %

19. Of the total access times, please indicate below the approximate percentage of uses by each of the following occupations of users:

Faculty	___ %	Students	___ %
Professionals	___ %	Others	___ %

20. According to your experience, what are five advantages of using print publications?

a.

b.

c.

d.

e.

21. And what are five disadvantages?

a.

b.

c.

d.

e.

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Appendix 5.A3

INTERVIEW QUESTIONS WITH ENDUSERS FOR USAGE INFORMATION OF SELECTED DATABASES AND PRINT MATERIALS IN THREE SELECTED LIBRARIES

Interviewee:

Library: Date:

Please indicate your personal status with an x in the appropriate space for question 1 - 3.

1. Sex: Male ___ Female ___

2. Age: 20 years old and younger ___ 36 - 55 ___

21 - 35 ___ 56 and older ___

3. Education: With/without high school education ___

With college education ___ With graduate education ___

4. What is your occupation? _____

If you are a faculty member, please indicate that you are:

A faculty teaching doctoral students ___

A faculty teaching master's students ___

A faculty teaching undergraduate students ___

A faculty teaching grade 1-12 students ___

If you are a student, please indicate that you are:

A doctoral student ___ An undergraduate student ___

A master's student ___ A grade 1-12 student ___

5. How did you first learn about the online service in the library?

Referred by a librarian ___

Told by a friend ___

Read from a library announcement ___

Read from the library/institution newspaper ___

Learned from other sources (specify) _____

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6. Please indicate in the following list the number of times you used, or requested to use, each of the ten databases in the past six months:

Online Databases	No. of Access Times	Online Databases	No. of Access Times
a. Academic American Encyclopedia	___	f. Dissertation Abstracts Online	___
b. America: History and Life	___	g. Everyman's Encyclopedia	___
c. Biography Master Index	___	h. Harvard Business Review	___
d. Books in Print	___	i. Scisearch	___
e. CA Search	___	j. Social Scisearch	___

7. Please indicate in the following scale a number, which would best describe your overall satisfaction with the information you received from searching online databases:

0 1 2 3 4 5 6 7 8 9
----------*-----*-----*-----*-----*-----*-----*-----*

0 = complete dissatisfaction
9 = complete satisfaction

8. Who actually did online searches for your information? (Please indicate below with an x.)

	By a library personnel without my presence	By a library personnel with my presence	By myself without a librarian's help	By myself with a librarian's help
80 - 100 % of times	___	___	___	___
60 - 79 %	___	___	___	___
40 - 59 %	___	___	___	___
20 - 39 %	___	___	___	___
19 % and less	___	___	___	___
Others (specify)				

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9. Are your interested in actually doing online searches?

Yes ___ No ___

10. Have you ever read an article on screen? Yes ___ No ___

11. About how long did it take you to read the article?

About ___ minutes

12. What are your opinions about reading on screen?

13. How often did you request paper printouts of your search results?

For 80 - 100 % of searches___ For 20 - 39 % of searches ___

For 60 - 79 % of searches___ For 0 - 19 % of searches ___

For 40 - 59 % of searches___

14. On an average, how long did it take to receive the print-outs you requested?

Immmediately ___ Within three weeks ___

Within a week ___ More than three weeks ___

15. Did you have to pay a fee for online services?

Yes, always ___ Yes, partially ___ No, not at all ___

16. On an average, about how much did you pay for each search request, or each access to online search? $ ___

17. Who was responsible for the payment?

Myself ___ Myself and my institution ___

My institution ___ Others (specify) ___

18. Will you continue to use online services at the present rate of charge if you personally are responsible for all charges?

Yes ___ No ___

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19. According to your experience, what are five advantages of using online databases?

a. d.

b. e.

c.

20. And what are five disadvantages?

a. d.

b. e.

c.

21. In your opinions, what is the most important role of a librarian in online services?

An intermediary to search information for endusers ___

An educator to teach endusers to do online searching ___

A counselor to provide advice to online users ___

An expert for database structure ___

Others (specify) _____

22. Please indicate in the following list the number of times you used each of these print publications in the last six months:

Title of Publication	No. of Times Used	Title of Publication	No. of Times Ised
a. Academic American Encyclopedia	___	f. Dissertation Abstracts	___
b. America: History and Life	___	g. Everyman's Encyclopedia	___
c. Biography Master Index	___	h. Harvard Business Review	___
d. Books in Print	___	i. Science Citation Index	___
e. Chemical Abstracts	___	j. Social Science Citation Index	___

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23. Please indicate in the following scale a number, which would best describe your overall satisfaction with the information provided by these publications?

```
0     1     2     3     4     5     6     7     8     9
*-----*-----*-----*-----*-----*-----*-----*-----*-----*
```

0 = complete dissatisfaction
9 = complete satisfaction

24. Who actually did the search for your information from these publications? (Please indicate below with an x.)

	By a library personnel without my presence	By a library personnel with my presence	By myself without a librarian's help	By myself with a librarian's help
80 - 100 % of times	___	___	___	___
60 - 79 %	___	___	___	___
40 - 59 %	___	___	___	___
20 - 39 %	___	___	___	___
19 % and less	___	___	___	___
Others (specify)				

25. According to your experience, what are five advantages of using these publications?

a. d.

b. e.

c.

26. And what are five disadvantages?

a. d.

b. e.

c.

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Appendix 5.A4

A FORM LETTER REQUESTING AN INTERVIEW WITH THE ADMINISTRATORS OF SELECTED LIBRARIES FOR EXPENDITURE INFORMATION ON ONLINE SYSTEMS AND PRINT PUBLICATIONS

Dear

Thank you very much for your willingness to participate, and your permission to let me include your library, in my research project.

As I explained in our telephone conversation, the topic of my research is "Electronic Publishing and Its Impact on Print Publishing: A Study of Expenditure and Usage in Three Selected Libraries in Atlanta, Georgia." The project is an exploratory study for a thesis to be submitted to the University of Pittsburgh.

Also explained over the telephone, I need to gather for the project representative data concerning the expenditure and usage of the two forms of publishing in your library. I am requesting that you would kindly provide me about 30 minutes for an interview. The date and time shall be at your convenience. I will call you again to make an appointment.

Enclosed is a copy of my planned interview questionnaire. It would be helpful if you can go through it and provide the data for each question. With your help and cooperation, the interview should be very brief.

Your assistance for the interview and for providing necessary data will be very important for the completion of the entire research project and would be greatly appreciated.

Sincerely yours,

Chih Wang

Encl.: A planned interview questionnaire.

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Appendix 5.A5

A FORM LETTER REQUESTING AN INTERVIEW WITH REFERENCE LIBRARIANS OF SELECTED LIBRARIES FOR USAGE INFORMATION OF SELECTED DATABASES AND THEIR PRINT VERSIONS

Dear

I am a doctoral candidate at the University of Pittsburgh School of Library and Information Science. The topic of my research project is "Electronic Publishing and Its Impact on Print Publishing: a Study of Expenditure and Usage in Three Selected Libraries in Atlanta, Georgia," which has been approved by the dissertation committee at Pittsburgh.

Your library is one of the three selected for the research project. In the project, I need to interview you for usage information of selected Dialog databases and their print versions in your library. I am asking your help that you would provide me about 30 minutes for the interview. The date and time shall be at your convenience. I will call you to make an appointment.

Enclosed is a copy of my planned interview questionnaire. It would be helpful if you can go through it and provide the data for each question. With your help and cooperation, the interview should be very brief.

Your kind assistance for the interview and for providing the necessary data will be very important for the completion of the entire research project and would be greatly appreciated.

Sincerely yours,

Chih Wang

Encl.: A copy of planned interview questionnaire.

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Appendix 5.A6

A FORM LETTER REQUESTING REFERENCE LIBRARIANS OF SELECTED LIBRARIES TO DISTRIBUTE QUESTIONNAIRE TO ONLINE ENDUSERS

Dear

Thank you very much for your willingness to participate in, and your kindness to extend your help for, my research project.

As I explained in our telephone conversation, I need for the project at least ten (10) endusers of the Dialog system in your library to answer my questionnaire, which is prepared to collect the usage data of, and users' opinions on, ten (10) selected databases from the system and their print-on-paper versions.

I am asking that you or your staff would kindly distribute my questionnaire to those who have requested information from or have used the Dialog system in your library, and who are willing to participate in the project. I am also requesting that you would distribute the questionnaire to as diverse as possible a population of users with different age, educational, and occupational backgrounds.

Enclosed are 25 copies of the questionnaire, each with a self addressed and stamped returning evelope. Your cooperation and help in distributing, and encouraging the online endusers to complete and return, the questionnaire would be greatly appreciated.

Sincerely yours,

Chih Wang

Encl.: 25 copies of a questionnaire.
25 self addressed and stamped envelopes.

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Appendix 5.A7

A FORM LETTER REQUESTING ONLINE ENDUSERS TO COMPLETE AND RETURN QUESTIONNAIRE

Dear Dialog Online Users:

I am a doctoral candidate at the University of Pittsburgh School of Library and Information Science. Currently, I am working on an exploratory study for a dissertation. The topic of the study is entitled "Electronic Publishing and Its Impact on Print Publishing: a Study of Expenditure and Usage in Three Selected Libraries in Atlanta, Georgia."

Library is one of the three selected for the study. In the research project, I need to have at least ten (10) endusers of the Dialog online system in your library answer my questionnaire, which is prepared to collect the data of how you, the endusers, have used ten (10) selected databases from the Dialog system and their print-on-paper forms, and your opinions regarding the use of the two forms of publishing.

Attached is a copy of the questionnaire and a self addressed and stamped envelope. I am asking for your help to take about 30 minutes to complete the questionnaire, place it in the return envelope, and mail it back to me.

Your participation in the research and prompt response to the questionnaire are very important. You will not only help me complete the work for my degree, but will also provide information for a project, which would result in offering ideas for projecting, planning, and improving library/information services. I earnestly urge you to complete and return to me the attached questionnaire, and would greatly appreciate your help.

Sincerely yours,

Chih Wang

Encl.: A copy of questionnaire.
A self addressed and stamped envelope.

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@SPSS-X

Appendix 6.A101

ANALYSIS OF CORRELATION BETWEEN EXPENDITURE FOR ELECTRONIC AND PRINT PUBLISHING IN THREE SELECTED LIBRARIES, 1982-86

```
02 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
09:40:05    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
        PLOT - Scatter plots, overlay plots, contour plots on the printer.
  HILOGLINEAR - Fast loglinear analysis for hierarchical models.
     CLUSTER - Hierarchical cluster analysis.
QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
      PROBIT - Dichotomous probit and logistic regression analysis.
   SET WIDTH - Width control for printed output.
       XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

  1  0          TITLE          EXPENDITURES REPORTED BY ADMINISTRATORS
  2  0          FILE HANDLE    INDATA / NAME = 'EXPDATA.'
  3  0          DATA LIST      FILE = INDATA
  4  0                         /E1 17-21(2) E2 23-27(2) E3 29-34(2)
  5  0                         E4 35-41(2) P1 43-49(2) P2 51-57(2)
  6  0                         P3 59-65(2) P4 67-73(2)

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          E1           1     17     21          F           5    2
          E2           1     23     27          F           5    2
          E3           1     29     34          F           6    2
          E4           1     35     41          F           6    2
          P1           1     43     49          F           7    2
          P2           1     51     57          F           7    2
          P3           1     59     65          F           7    2
          P4           1     67     73          F           7    2

END OF DATALIST TABLE.

  7  0          VAR LABELS
  8  0                         E1 'ON ELECTRONIC PUBLISHING, AFPL'
  9  0                         E2 'ON ELECTRONIC PUBLISHING, EMUL'
 10  0                         E3 'ON ELECTRONIC PUBLISHING, GSUL'
 11  0                         E4 'ON ELECTRONIC PUBLISHING, SUM'
 12  0                         P1 'ON PRINT PUBLISHING, AFPL'
 13  0                         P2 'ON PRINT PUBLISHING, EMUL'
 14  0                         P3 'ON PRINT PUBLISHING, GSUL'
 15  0                         P4 'ON PRINT PUBLISHING, SUM'
 16  0          SCATTERGRAM
 17  0                         P1 P2 P3 P4 WITH E1 E2 E3 E4
 18  0          OPTIONS 4,7
 19  0          STATISTICS ALL

***** GIVEN WORKSPACE ALLOWS FOR    667 CASES FOR SCATTERGRAM PROBLEM *****
```


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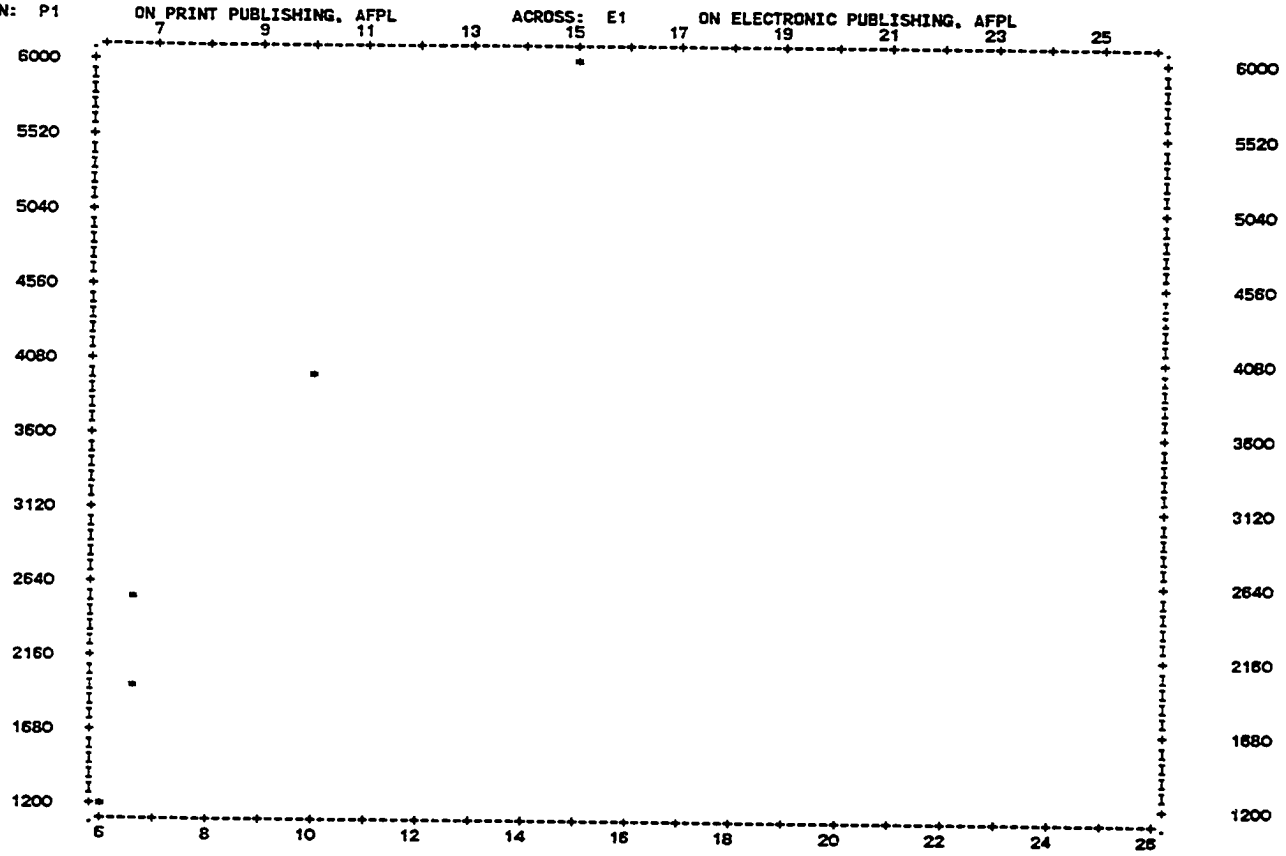
DOWN: P1 ON PRINT PUBLISHING, AFPL ACROSS: E1 ON ELECTRONIC PUBLISHING, AFPL



STATISTICS..

CORRELATION (R)-	.97651	R SQUARED -	.95356	SIGNIFICANCE -	.00215
STD ERR OF EST -	471.99154	INTERCEPT (A) -	-1155.95353	SLOPE (B) -	487.06956
PLOTTED VALUES -	5	EXCLUDED VALUES-	0	MISSING VALUES -	0

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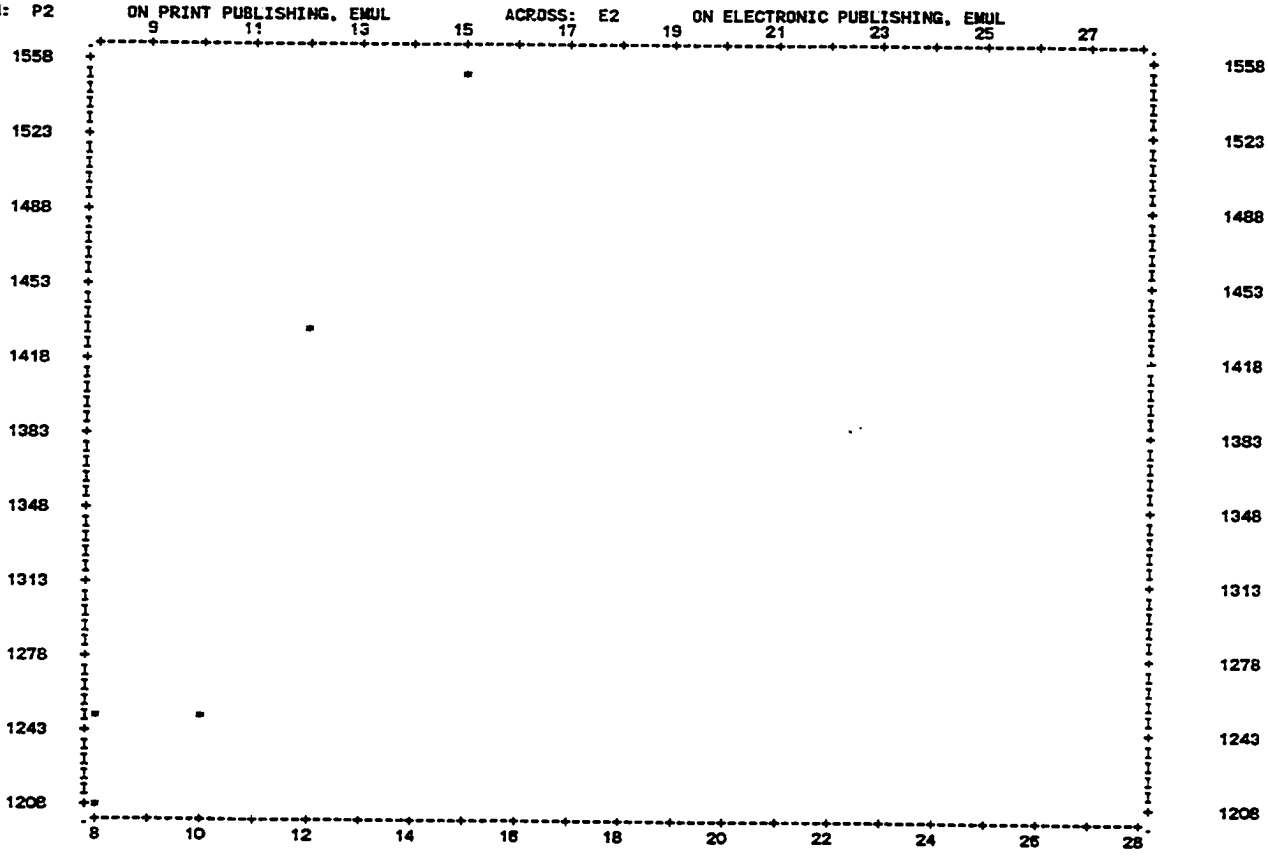
DOWN: P2 ON PRINT PUBLISHING, EMUL ACROSS: E2 ON ELECTRONIC PUBLISHING, EMUL



STATISTICS..

CORRELATION (R)-	.98533	R SQUARED -	.93186	SIGNIFICANCE -	.00386
STD ERR OF EST -	44.28325	INTERCEPT (A) -	831.44534	SLOPE (B) -	47.80648
PLOTTED VALUES -	5	EXCLUDED VALUES-	0	MISSING VALUES -	0

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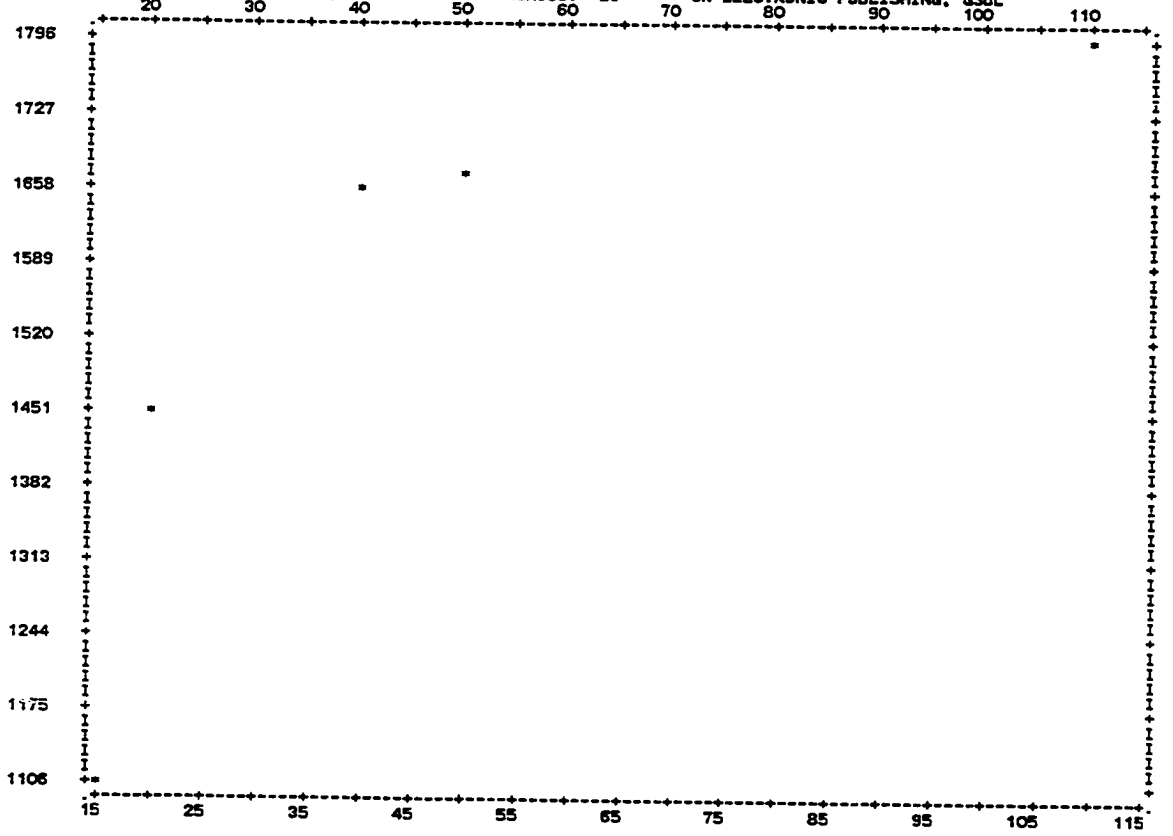
DOWN: P3 ON PRINT PUBLISHING, GSUL ACROSS: E3 ON ELECTRONIC PUBLISHING, GSUL



STATISTICS..

CORRELATION (R)	.77265	R SQUARED	.59699	SIGNIFICANCE	.06280
STD ERR OF EST	197.94956	INTERCEPT (A)	1279.08962	SLOPE (B)	5.48882
PLOTTED VALUES	5	EXCLUDED VALUES	0	MISSING VALUES	0

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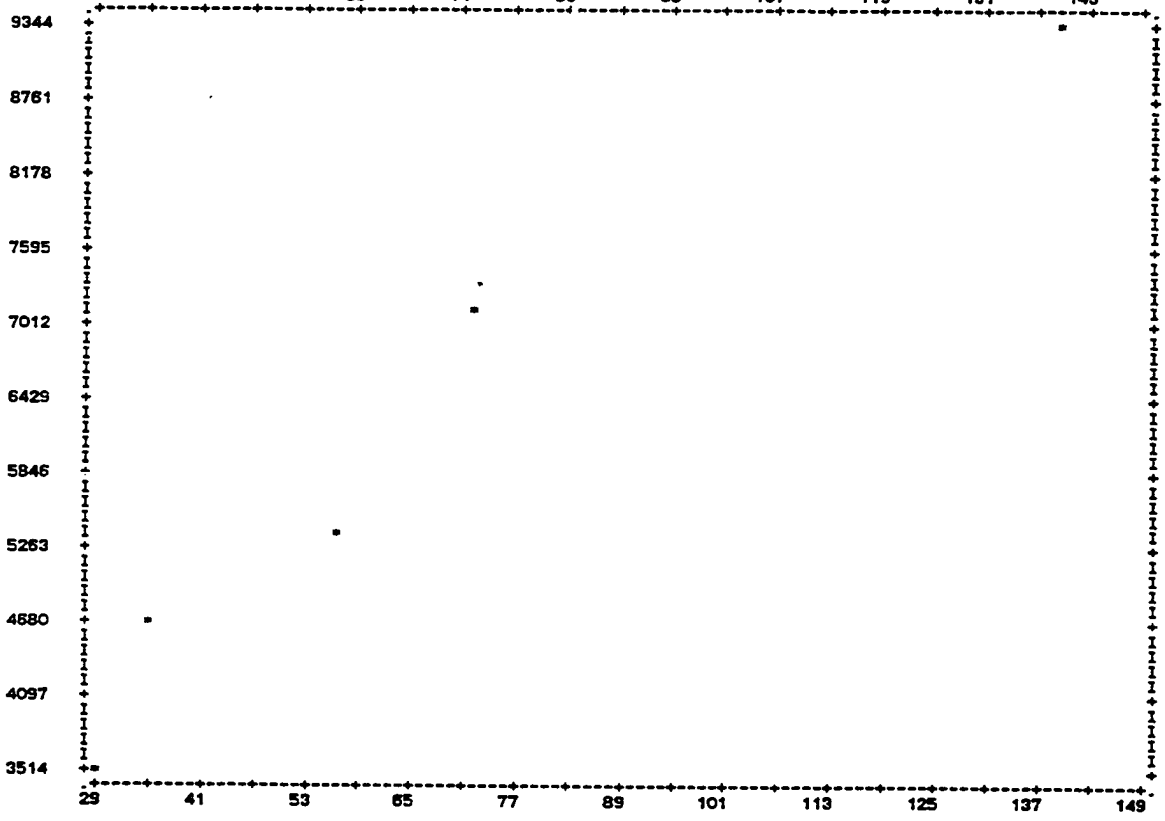
DOWN: P4 ON PRINT PUBLISHING, SUM ACROSS: E4 ON ELECTRONIC PUBLISHING, SUM



STATISTICS..

CORRELATION (R)-	.96891	R SQUARED -	.93879	SIGNIFICANCE -	.00328
STD ERR OF EST -	648.34361	INTERCEPT (A) -	2740.62025	SLOPE (B) -	49.30198
PLOTTED VALUES -	5	EXCLUDED VALUES-	0	MISSING VALUES -	0

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```
PRECEDING TASK REQUIRED       3.33 SECONDS CPU TIME;       6.34 SECONDS ELAPSED.

  20  0          PEARSON CORR
  21  0                       P1 P2 P3 P4 WITH E1 E2 E3 E4
  22  0          OPTIONS 3,6
  23  0          STATISTICS 1

*****PEARSON CORR PROBLEM REQUIRES     768 WORDS WORKSPACE *****
```


VARIABLE	CASES	MEAN	STD DEV
P1	5	3140.0000	1896.8395
P2	5	1338.1940	146.9108
P3	5	1537.0640	270.0402
P4	5	6015.2560	2269.3821
E1	5	8.8200	3.8029
E2	5	10.6000	2.9665
E3	5	47.0000	38.0132
E4	5	66.4200	44.5991

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- - - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
P1 WITH E1	.9765 N(5) SIG .002	P1 WITH E2	.9854 N(5) SIG .001	P1 WITH E3	.9712 N(5) SIG .003	P1 WITH E4	.9766 N(5) SIG .002	P2 WITH E1	.9796 N(5) SIG .002	P2 WITH E2	.9853 N(5) SIG .005
P2 WITH E3	.9301 N(5) SIG .016	P2 WITH E4	.9405 N(5) SIG .012	P3 WITH E1	.6350 N(5) SIG .180	P3 WITH E2	.8048 N(5) SIG .088	P3 WITH E3	.7727 N(5) SIG .113	P3 WITH E4	.7713 N(5) SIG .114
P4 WITH E1	.9623 N(5) SIG .005	P4 WITH E2	.9819 N(5) SIG .002	P4 WITH E3	.9639 N(5) SIG .005	P4 WITH E4	.9689 N(5) SIG .004				

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PRECEDING TASK REQUIRED .33 SECONDS CPU TIME; .86 SECONDS ELAPSED.

```
  24  O          FINISH

    24 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     4 SECONDS CPU TIME.
     9 SECONDS ELAPSED TIME.
       END OF JOB.
```


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Appendix 6.A102a

ANALYSIS OF CORRELATION BETWEEN USAGE OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRARIANS

```
03 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
09:32:00    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           USAGE REPORTED BY LIBRARIANS
   2  0          FILE HANDLE     INDATA / NAME = 'USADATL.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /OP1 17-18 OP2 21-22 OP3 25-26 OP4 30-31
   5  0                          PP1 34-35 PP2 38-40 PP3 43-44 PP4 47-49

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          OP1          1     17     18          F           2    0
          OP2          1     21     22          F           2    0
          OP3          1     25     26          F           2    0
          OP4          1     30     31          F           2    0
          PP1          1     34     35          F           2    0
          PP2          1     38     40          F           3    0
          PP3          1     43     44          F           2    0
          PP4          1     47     49          F           3    0

END OF DATALIST TABLE.

   6  0          VAR LABELS      OP1 'ONLINE PUBLICATIONS, AFPL'
   7  0                          OP2 'ONLINE PUBLICATIONS, EMUL'
   8  0                          OP3 'ONLINE PUBLICATIONS, GSUL'
   9  0                          OP4 'ONLINE PUBLICATIONS, SUM'
  10  0                          PP1 'PRINT PUBLICATIONS, AFPL'
  11  0                          PP2 'PRINT PUBLICATIONS, EMUL'
  12  0                          PP3 'PRINT PUBLICATIONS, GSUL'
  13  0                          PP4 'PRINT PUBLICATIONS, SUM'
  14  0          SCATTERGRAM     PP1 PP2 PP3 PP4 WITH OP1 OP2 OP3 OP4
  15  0          OPTIONS         4,7
  16  0          STATISTICS      ALL

***** GIVEN WORKSPACE ALLOWS FOR    667 CASES FOR SCATTERGRAM PROBLEM *****
```


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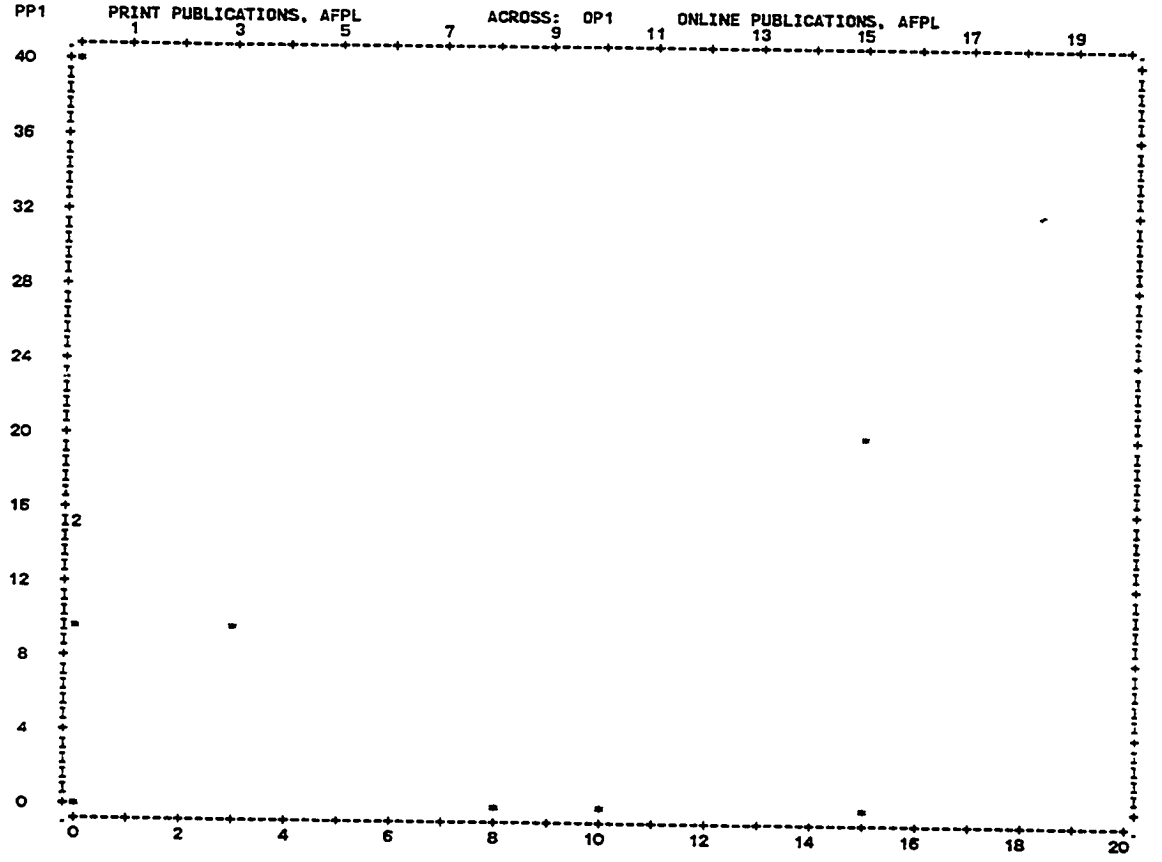

STATISTICS..

CORRELATION (R)-	-.31955	R SQUARED -	.10211	SIGNIFICANCE -	.18405
STD ERR OF EST -	12.71298	INTERCEPT (A) -	14.24635	SLOPE (B) -	-.63654
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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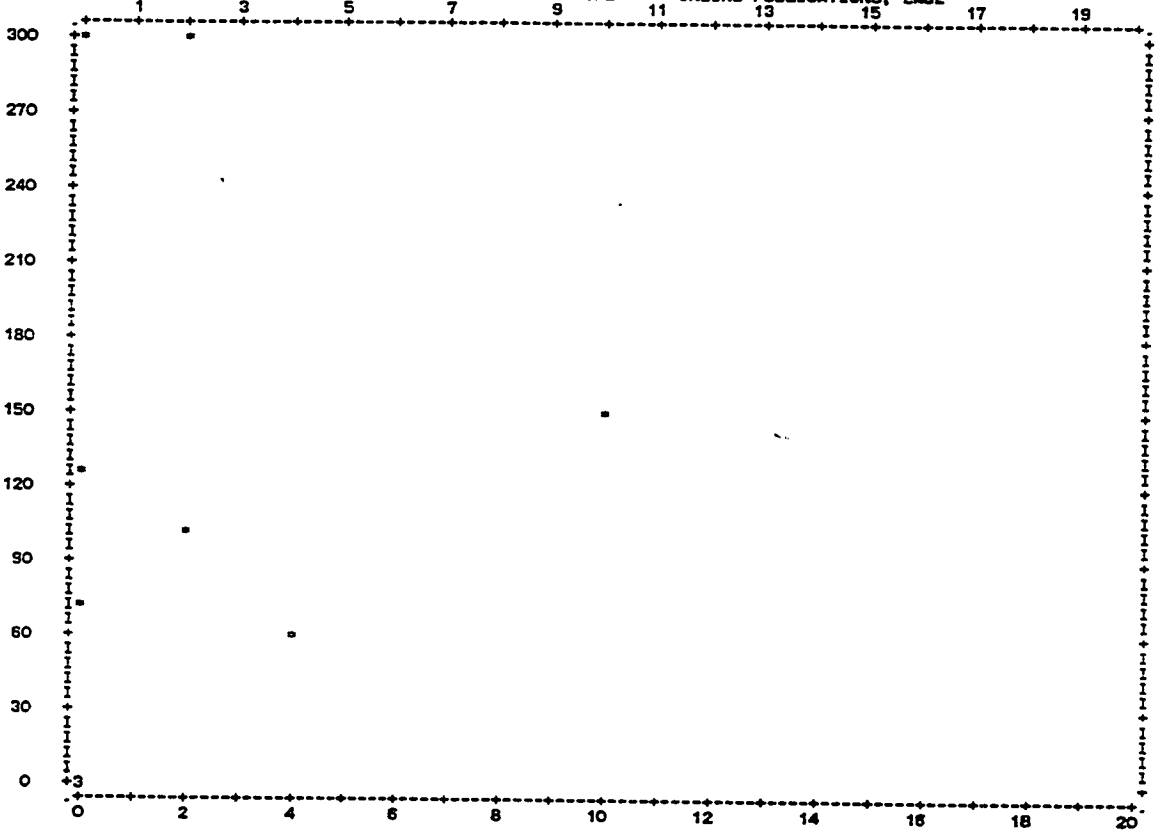
DOWN: PP2 PRINT PUBLICATIONS, EMUL ACROSS: OP2 ONLINE PUBLICATIONS, EMUL



STATISTICS..

CORRELATION (R)-	.17012	R SQUARED -	.02894	SIGNIFICANCE -	.31922
STD ERR OF EST -	117.90254	INTERCEPT (A) -	99.67249	SLOPE (B) -	6.01528
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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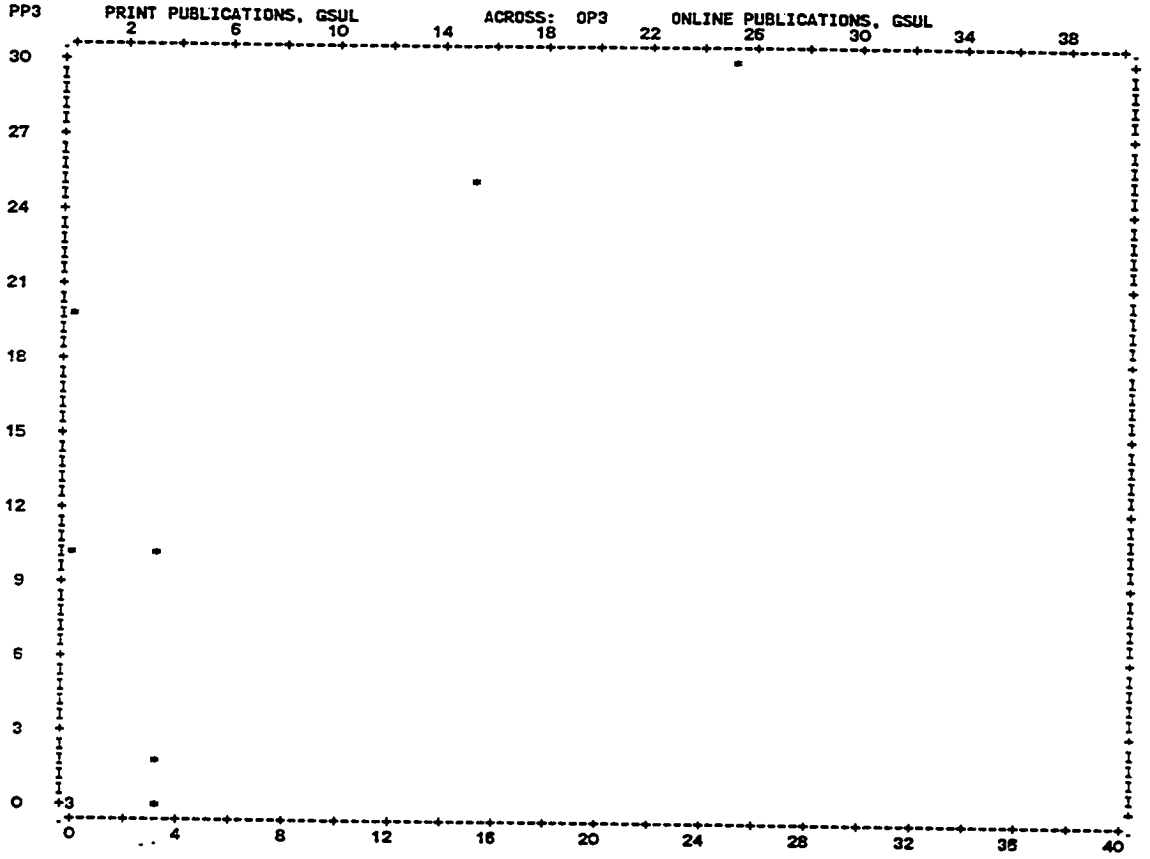

STATISTICS..

CORRELATION (R)-	.78826	R SQUARED -	.62136	SIGNIFICANCE -	.00338
STD ERR OF EST -	7.49884	INTERCEPT (A) -	4.42456	SLOPE (B) -	1.07662
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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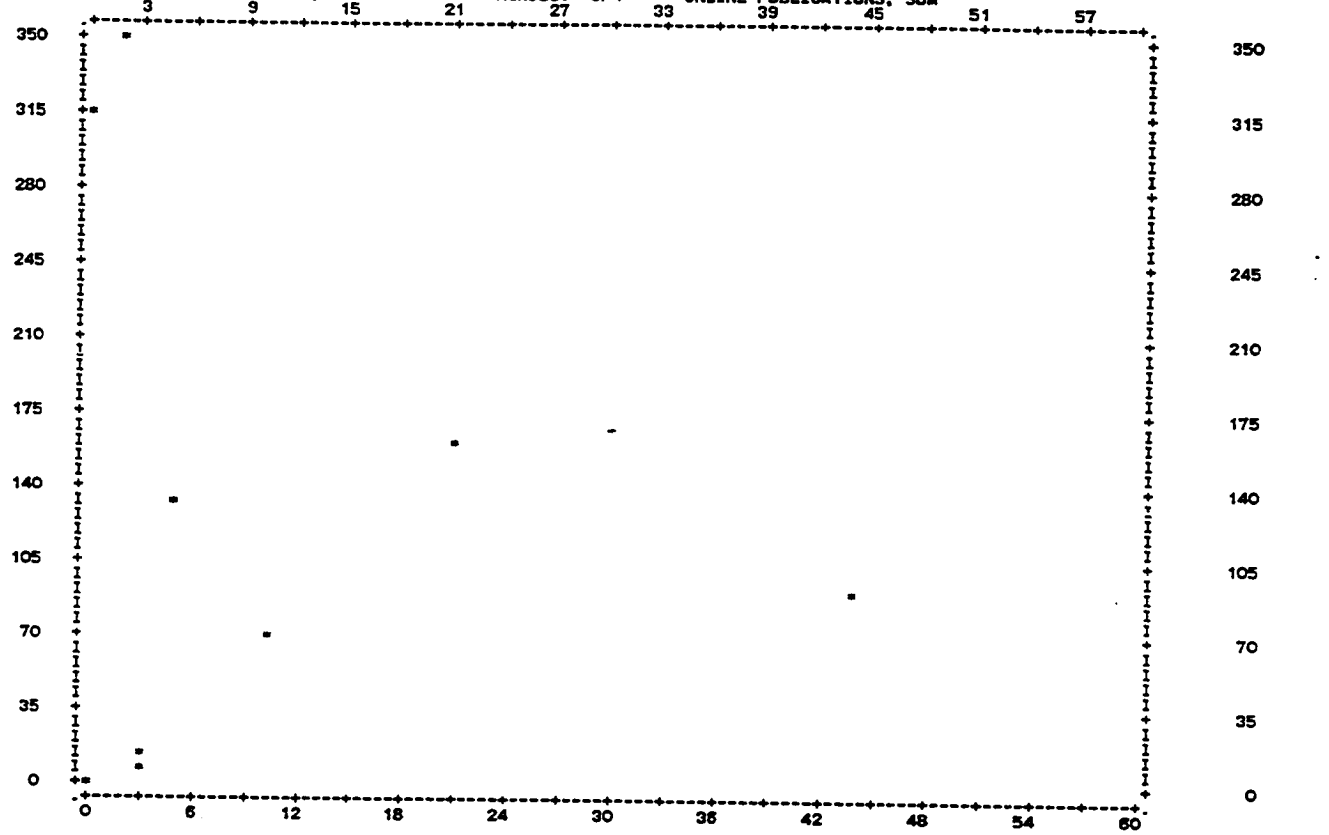
DOWN: PP4 PRINT PUBLICATIONS, SUM ACROSS: OP4 ONLINE PUBLICATIONS, SUM



STATISTICS..

CORRELATION (R)-	-.05632	R SQUARED -	.00317	SIGNIFICANCE -	.43859
STD ERR OF EST -	129.39925	INTERCEPT (A) -	136.60514	SLOPE (B) -	-.45806
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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```
PRECEDING TASK REQUIRED       3.38 SECONDS CPU TIME:       7.35 SECONDS ELAPSED.

  17  0          PEARSON CORR     PP1 PP2 PP3 PP4 WITH OP1 OP2 OP3 OP4
  18  0          OPTIONS          3,6
  19  0          STATISTICS       1

*****PEARSON CORR PROBLEM REQUIRES     768 WORDS WORKSPACE *****
```


VARIABLE	CASES	MEAN	STD DEV
PP1	10	11.0000	12.6491
PP2	10	110.5000	112.8039
PP3	10	9.7000	11.4896
PP4	10	131.2000	122.1927
OP1	10	5.1000	6.3500
OP2	10	1.8000	3.1903
OP3	10	4.9000	8.4123
OP4	10	11.8000	15.0244

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- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
PP1 WITH OP1	-.3195 N(10) SIG .367	PP1 WITH OP2	-.2698 N(10) SIG .450	PP1 WITH OP3	-.1712 N(10) SIG .635	PP1 WITH OP4	-.2882 N(10) SIG .418	PP2 WITH OP1	-.1025 N(10) SIG .778	PP2 WITH OP2	.1701 N(10) SIG .638
PP2 WITH OP3	-.1851 N(10) SIG .606	PP2 WITH OP4	-.1114 N(10) SIG .759	PP3 WITH OP1	.7162 N(10) SIG .019	PP3 WITH OP2	.3195 N(10) SIG .367	PP3 WITH OP3	.7883 N(10) SIG .006	PP3 WITH OP4	.8119 N(10) SIG .004
PP4 WITH OP1	-.0603 N(10) SIG .868	PP4 WITH OP2	.1592 N(10) SIG .660	PP4 WITH OP3	-.1154 N(10) SIG .750	PP4 WITH OP4	-.0563 N(10) SIG .877				

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PRECEDING TASK REQUIRED .36 SECONDS CPU TIME: 1.74 SECONDS ELAPSED.

```
  20  0          FINISH

    20 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     4 SECONDS CPU TIME.
    11 SECONDS ELAPSED TIME.
       END OF JOB.
```


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@SPSS-X

Appendix 6.A102b

ANALYSIS OF CORRELATION BETWEEN USAGE OF SELECTED ONLINE AND PRINT PUBLICATIONS IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE    1
11:55:43     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC. LICENSE NUMBER:   12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           USAGE BY ENDUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'USADATE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /OP1 20-21 OP2 24-25 OP3 28-29 OP4 32-34
   5  0                          PP1 40-42 PP2 45-46 PP3 49-50 PP4 53-55

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC
          OP1          1     20     21          F           2    0
          OP2          1     24     25          F           2    0
          OP3          1     28     29          F           2    0
          OP4          1     32     34          F           3    0
          PP1          1     40     42          F           3    0
          PP2          1     45     46          F           2    0
          PP3          1     49     50          F           2    0
          PP4          1     53     55          F           3    0

END OF DATALIST TABLE.

   6  0          VAR LABELS      OP1 'ONLINE PUBLICATIONS, AFPL'
   7  0                          OP2 'ONLINE PUBLICATIONS, EMUL'
   8  0                          OP3 'ONLINE PUBLICATIONS, GSUL'
   9  0                          OP4 'ONLINE PUBLICATIONS, SUM'
  10  0                          PP1 'PRINT PUBLICATIONS, AFPL'
  11  0                          PP2 'PRINT PUBLICATIONS, EMUL'
  12  0                          PP3 'PRINT PUBLICATIONS, GSUL'
  13  0                          PP4 'PRINT PUBLICATIONS, SUM'
  14  0          SCATTERGRAM     PP1 PP2 PP3 PP4 WITH OP1 OP2 OP3 OP4
  15  0          OPTIONS         4,7
  16  0          STATISTICS      ALL

***** GIVEN WORKSPACE ALLOWS FOR    887 CASES FOR SCATTERGRAM PROBLEM *****
```


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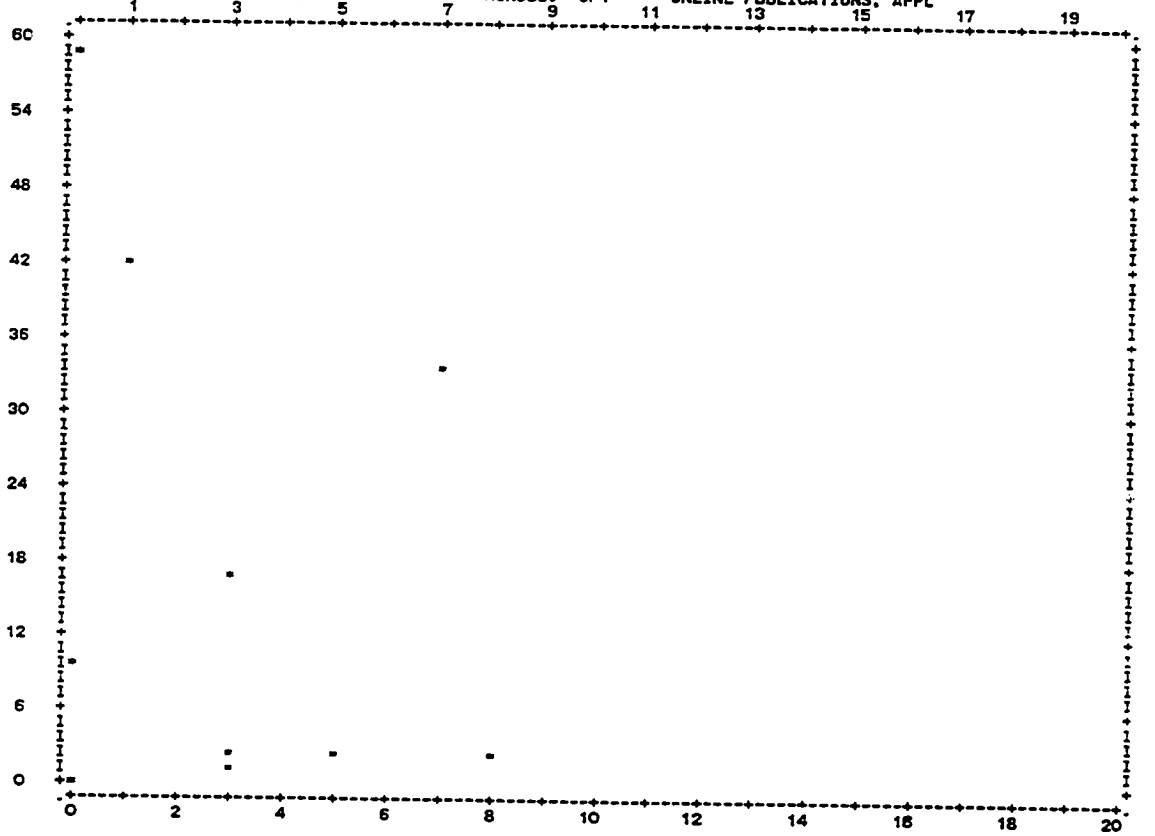
DOWN: PP1 PRINT PUBLICATIONS, AFPL ACROSS: OP1 ONLINE PUBLICATIONS, AFPL



STATISTICS..

CORRELATION (R)-	-.25473	R SQUARED -	.06489	SIGNIFICANCE -	.23878
STD ERR OF EST -	21.40028	INTERCEPT (A) -	22.48624	SLOPE (B) -	-1.82895
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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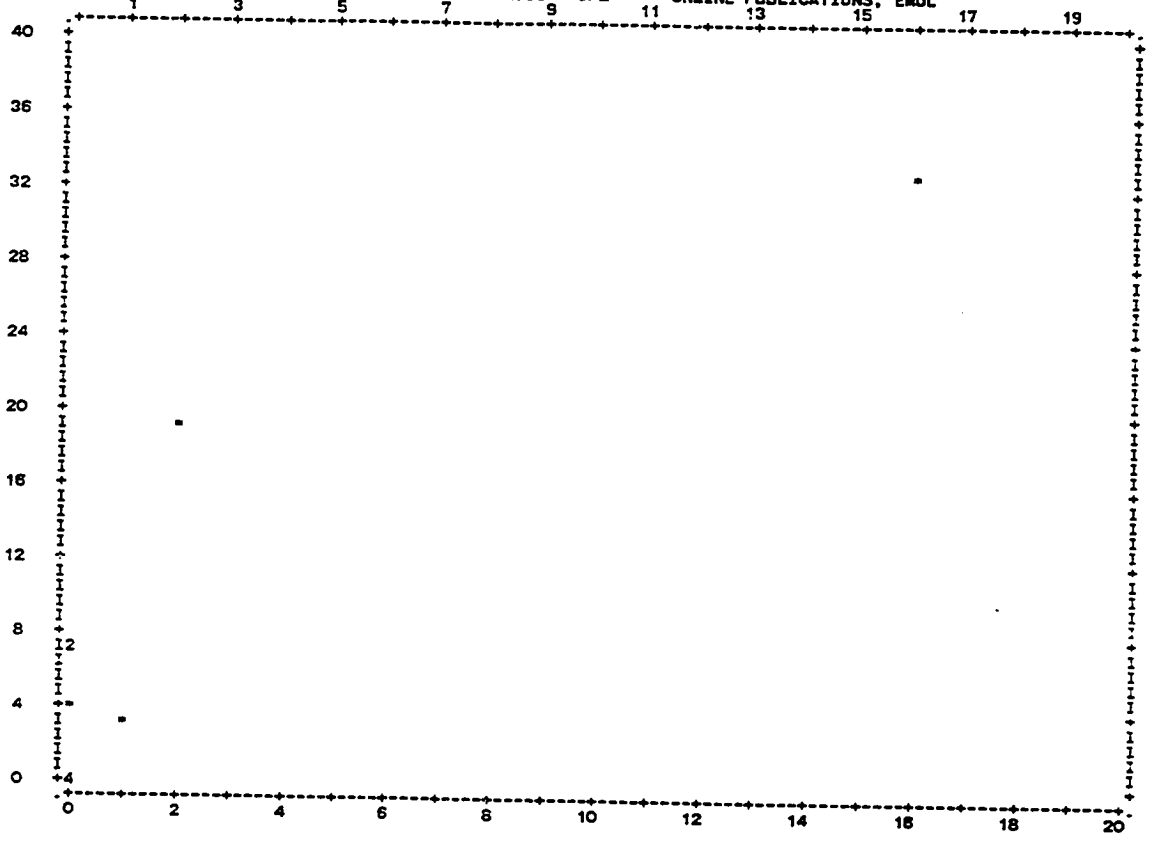
DOWN: PP2 PRINT PUBLICATIONS, EMUL ACROSS: OP2 ONLINE PUBLICATIONS, EMUL



STATISTICS..

CORRELATION (R)-	.88989	R SQUARED -	.79155	SIGNIFICANCE -	.00028
STD ERR OF EST -	5.20588	INTERCEPT (A) -	3.68474	SLOPE (B) -	1.91329
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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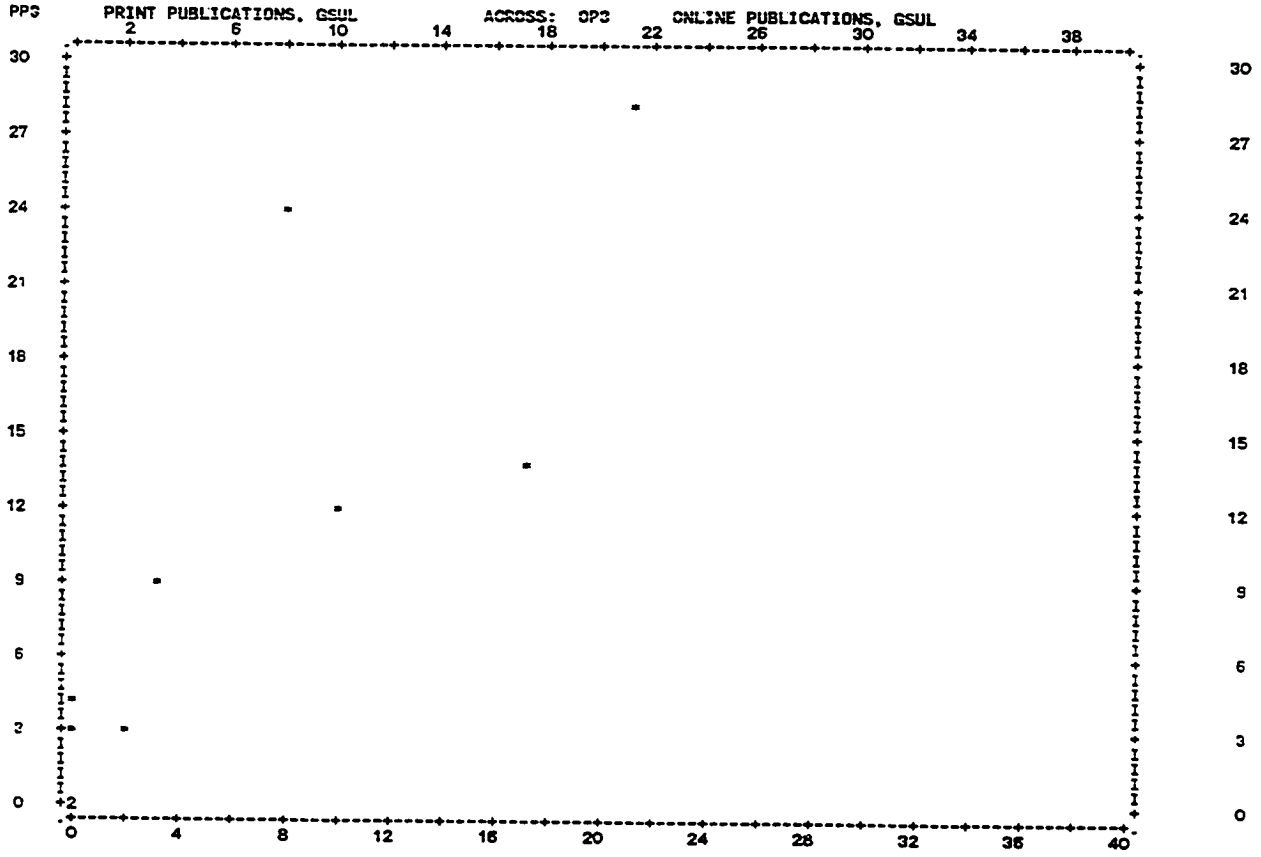

STATISTICS..

CORRELATION (R)-	.8472(	R SQUARED -	.71775	SIGNIFICANCE -	.00099
STD ERR OF EST -	5.55332	INTERCEPT (A) -	2.09366	SLOPE (B) -	1.08307
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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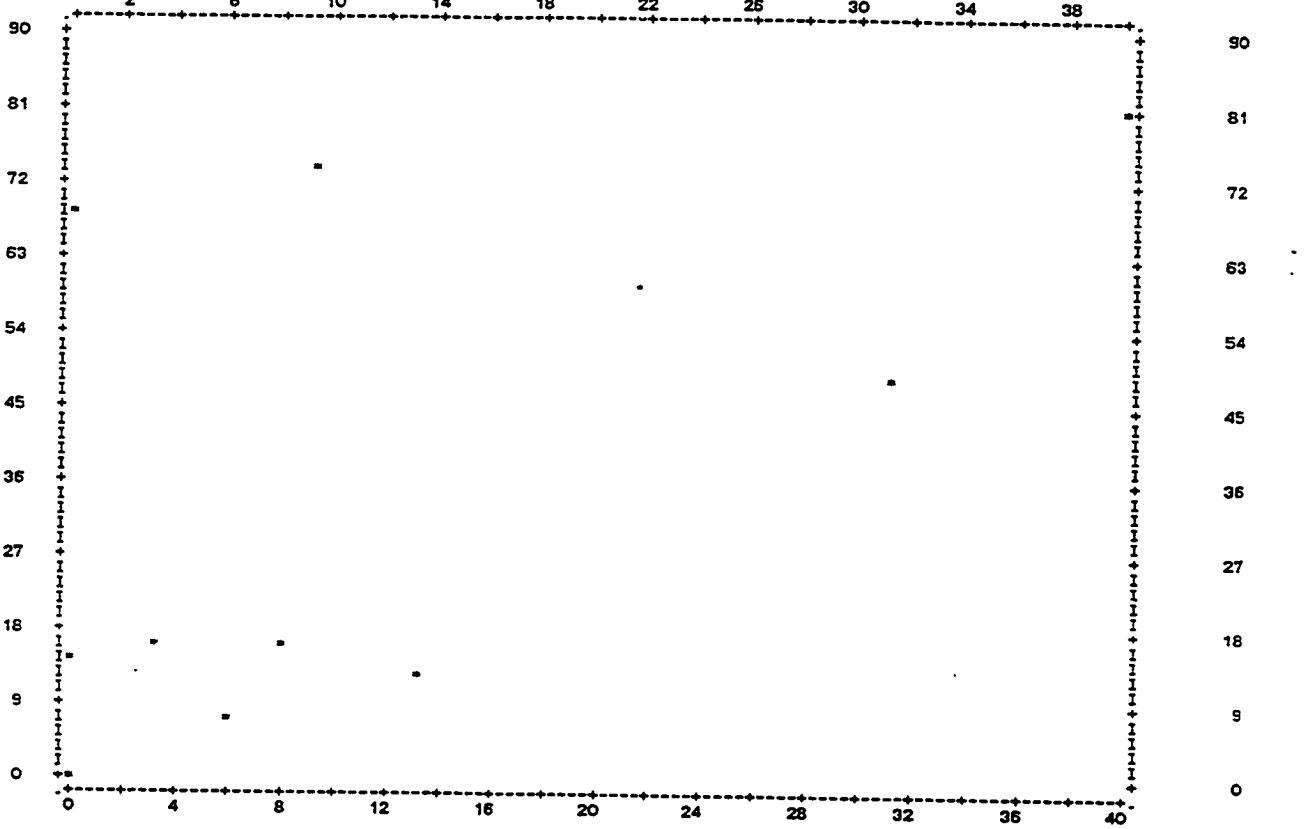
DOWN: PP4 PRINT PUBLICATIONS, SUM ACROSS: OP4 ONLINE PUBLICATIONS, SUM



STATISTICS..

CORRELATION (R)-	.54457	R SQUARED -	.29655	SIGNIFICANCE -	.05180
STD ERR OF EST -	27.28408	INTERCEPT (A) -	20.67135	SLOPE (B) -	1.21170
PLOTTED VALUES -	10	EXCLUDED VALUES-	0	MISSING VALUES -	0

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```
PRECEDING TASK REQUIRED       3.35 SECONDS CPU TIME;       6.80 SECONDS ELAPSED.

  17  0          PEARSON CORR    PP1 PP2 PP3 PP4 WITH OP1 OP2 OP3 OP4
  18  0          OPTIONS         3,6
  19  0          STATISTICS      1

*****PEARSON CORR PROBLEM REQUIRES     768 WORDS WORKSPACE *****
```


VARIABLE	CASES	MEAN	STD DEV
PP1	10	17.0000	20.8846
PP2	10	7.3000	10.7502
PP3	10	9.7000	9.8551
PP4	10	34.0000	30.6703
OP1	10	3.0000	2.9059
OP2	10	1.9000	4.9389
OP3	10	6.1000	7.7093
OP4	10	11.0000	13.7840

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- - - - - - - - - - - - - - PEARSON CORRELATION COEFFICIENTS - - - - - - - - - - - - - -

VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR		VARIABLE PAIR	
PP1 WITH OP1	-.2547 N(10) SIG .476	PP1 WITH OP2	.2418 N(10) SIG .500	PP1 WITH OP3	-.0401 N(10) SIG .912	PP1 WITH OP4	.0116 N(10) SIG .975	PP2 WITH OP1	.7114 N(10) SIG .020	PP2 WITH OP2	.8897 N(10) SIG .000
PP2 WITH OP3	.7893 N(10) SIG .006	PP2 WITH OP4	.9140 N(10) SIG .000	PP3 WITH OP1	.5626 N(10) SIG .088	PP3 WITH OP2	.2226 N(10) SIG .535	PP3 WITH OP3	.8472 N(10) SIG .002	PP3 WITH OP4	.6732 N(10) SIG .031
PP4 WITH OP1	.2568 N(10) SIG .473	PP4 WITH OP2	.5479 N(10) SIG .099	PP4 WITH OP3	.5216 N(10) SIG .120	PP4 WITH OP4	.5446 N(10) SIG .101				

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PRECEDING TASK REQUIRED .35 SECONDS CPU TIME; .93 SECONDS ELAPSED.

```
  20  C          FINISH

    20 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     4 SECONDS CPU TIME.
     9 SECONDS ELAPSED TIME.
       END OF JOB.
```


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@SPSS-X

Appendix 6.A201

ANALYSIS OF VARIANCE OF EXPENDITURE FOR ELECTRONIC PUBLISHING AMONG THREE SELECTED LIBRARIES, 1982-86

```
02 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
10:07:38     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE
   2  0                        'EXPENDITURES ON ELECTRONIC PUBLISHING'
   3  0          FILE HANDLE
   4  0                        INDATA / NAME = 'EXPEDAT.'
   5  0          DATA LIST
   6  0                        FILE = INDATA
   7  0                        /1 LIBRARY 21 DOLLARS 29-34(2)
THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          LIBRARY      1     21     21         F           1    0
          DOLLARS      1     29     34         F           6    2

END OF DATALIST TABLE.

   8  0          VAR LABELS
   9  0                        LIBRARY (1) AFPL (2) EMUL (3) GSUL
  10  0          ONEWAY DOLLARS BY LIBRARY (1,3)/
  11  0              RANGES = TUKEY/
  12  0              RANGES = SCHEFFE/
  13  0          OPTIONS      6
  14  0          STATISTICS   1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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- - - -

- O N E W A Y -

VARIABLE DOLLARS
BY VARIABLE LIBRARY (1) AFPL (2) EMUL (3) GSUL

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

3.94 3.94

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
15.6432 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 1	GRP 2	GRP 3
MEAN	8.8200	10.6000	47.0000

PRECEDING TASK REQUIRED .62 SECONDS CPU TIME: 2.07 SECONDS ELAPSED.

```
  15  0          FINISH

    15 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     3 SECONDS ELAPSED TIME.
       END OF JOB.
```


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Appendix 6.A202

ANALYSIS OF VARIANCE OF EXPENDITURE FOR PRINT PUBLISHING AMONG THREE SELECTED LIBRARIES, 1982-86

```
02 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE   1
10:10:09    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
        PLOT - Scatter plots, overlay plots, contour plots on the printer.
  HILOGLINEAR - Fast loglinear analysis for hierarchical models.
     CLUSTER - Hierarchical cluster analysis.
QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
      PROBIT - Dichotomous probit and logistic regression analysis.
   SET WIDTH - Width control for printed output.
       XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE
   2  0                        EXPENDITURES ON PRINT PUBLISHING
   3  0          FILE HANDLE
   4  0                        INDATA / NAME = 'EXPPDAT.'
   5  0          DATA LIST     FILE = INDATA
   6  0                        /1 LIBRARY 20 DOLLARS 30-36(2)

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          LIBRARY      1     20     20          F           1    0
          DOLLARS      1     30     36          F           7    2

END OF DATALIST TABLE.


   7  0          VAR LABELS
   8  0                        LIBRARY (1) AFPL (2) EMUL (3) GSUL
   9  0          ONEWAY DOLLARS BY LIBRARY (1,3)/
  10  0                        RANGES = TUKEY/
  11  0                        RANGES = SCHEFFE/
  12  0          OPTIONS       6
  13  0          STATISTICS    1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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- O N E W A Y -

VARIABLE DOLLARS
BY VARIABLE LIBRARY (1) AFPL (2) EMUL (3) GSUL

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	9759096.598	4879548.299	3.9644	.0477
WITHIN GROUPS	12	14770017.96	1230834.830		
TOTAL	14	24529114.56			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP 1	5	3140.0000	1896.8395	848.2924	1200.0000	6000.0000	784.8010 TO 5495.1990
GRP 2	5	1338.1940	146.9108	65.7005	1208.4500	1550.3100	1155.7831 TO 1520.6049
GRP 3	5	1537.0640	270.0402	120.7656	1106.2800	1793.3200	1201.7703 TO 1872.3577
TOTAL	15	2005.0860	1323.6614	341.7679	1106.2800	6000.0000	1272.0668 TO 2738.1052

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .9744, P = .000 (APPROX.)
BARTLETT-BOX F = 11.087, P = .000
MAXIMUM VARIANCE / MINIMUM VARIANCE 166.707

- O N E W A Y -

VARIABLE DOLLARS
BY VARIABLE LIBRARY (1) AFPL (2) EMUL (3) GSUL

MULTIPLE RANGE TEST

TUKEY-HSD PROCEDURE
RANGES FOR THE .050 LEVEL -

3.77 3.77

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
784.4654 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 2	GRP 3	GRP 1
MEAN	1338.1940	1537.0640	3140.0000

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- O N E W A Y -

VARIABLE DOLLARS
BY VARIABLE LIBRARY (1) AFPL (2) EMUL (3) GSUL

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

3.94 3.94

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
784.4854 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 2	GRP 3	GRP 1
MEAN	1338.1940	1537.0640	3140.0000

PRECEDING TASK REQUIRED .60 SECONDS CPU TIME; 2.76 SECONDS ELAPSED.

```
  14  0          FINISH

    14 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     4 SECONDS ELAPSED TIME.
       END OF JOB.
```


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```
IO STATUS   000000000006 WRITING EOF

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```

Appendix 6.A203a

ANALYSIS OF VARIANCE OF USAGE AMONG TEN SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRAIANS

```
02 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE   1
12:19:47    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           DATABASE USAGE REPORTED BY LIBRARIANS
   2  0          FILE HANDLE     INDATA / NAME = 'DBUSDAL.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 DATABASE 19-20 TIMES 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          DATABASE     1     19     20         F           2    0
          TIMES        1     30     31         F           2    0

END OF DATALIST TABLE.


   5  0          VAR LABELS
   6  0                          DATABASE (1) DB1 (2) DB2 (3) DB3 (4) DB4
   7  0                          DATABASE (5) DB5 (6) DB6 (7) DB7
   8  0                          DATABASE (8) DB8 (9) DB9 (10) DB10
   9  0          ONEWAY          TIMES BY DATABASE(1,10)/
  10  0                          RANGES = TUKEY/
  11  0                          RANGES = SCHEFFE/
  12  0          OPTIONS         6
  13  0          STATISTICS      1,3

     248 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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- - - -

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 7	GRP 8	GRP 4	GRP 5	GRP 9	GRP 3	GRP 1	GRP 2
MEAN	.0000	.0000	.6667	1.0000	1.0000	1.6667	3.3333	7.0000

GROUP	GRP10
MEAN	10.0000

SUBSET 2

GROUP	GRP 4	GRP 5	GRP 9	GRP 3	GRP 1	GRP 2	GRP10	GRP 6
MEAN	.6667	1.0000	1.0000	1.6667	3.3333	7.0000	10.0000	14.6667

ONEWAY

VARIABLE TIMES
BY VARIABLE DATABASE (8) DB8 (9) DB9 (10) DB10

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

6.56 6.56 6.56 6.56 6.56 6.56 6.56 6.56 6.56

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
3.4737 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 7	GRP 8	GRP 4	GRP 5	GRP 9	GRP 3	GRP 1	GRP 2
MEAN	.0000	.0000	.6667	1.0000	1.0000	1.6667	3.3333	7.0000

GROUP	GRP10	GRP 6
MEAN	10.0000	14.6667

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@SPSS-X

Appendix 6.A203b

ANALYSIS OF VARIANCE OF USAGE AMONG TEN SELECTED ONLINE DATABASES IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE    1
13:55:17    GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           DATABASE USAGE BY ENDEUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'DBUSDAE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 DATABASE 19-20 TIMES 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          DATABASE     1     19     20         F           2    0
          TIMES        1     30     31         F           2    0

END OF DATALIST TABLE.


   5  0          VAR LABELS      DATABASE (1) DB1 (2) DB2 (3) DB3 (4) DB4
   6  0                          DATABASE (5) DB5 (6) DB6 (7) DB7
   7  0                          DATABASE (8) DB8 (9) DB9 (10) DB10
   8  0          ONEWAY          TIMES BY DATABASE(1,10)/
   9  0                          RANGES = TUKEY/
  10  0                          RANGES = SCHEFFE/
  11  0          OPTIONS         6
  12  0          STATISTICS      1,3

     248 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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- O N E W A Y -

VARIABLE TIMES
BY VARIABLE DATABASE (8) DB8 (9) DB9 (10) DB10

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	9	570.0000	63.3333	3.5120	.0092
WITHIN GROUPS	20	360.6667	18.0333		
TOTAL	29	930.6667			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP 1	3	0.0	0.0	0.0	0.0	0.0	0.0 TO 0.0
GRP 2	3	2.0000	1.0000	.5774	1.0000	3.0000	-.4842 TO 4.4842
GRP 3	3	2.6667	2.5166	1.4530	0.0	5.0000	-3.5850 TO 8.9183
GRP 4	3	3.0000	4.3589	2.5166	0.0	8.0000	-7.8282 TO 13.8282
GRP 5	3	1.0000	1.7321	1.0000	0.0	3.0000	-3.3027 TO 5.3027
GRP 6	3	13.3333	5.5076	3.1798	7.0000	17.0000	-.3484 TO 27.0150
GRP 7	3	0.0	0.0	0.0	0.0	0.0	0.0 TO 0.0
GRP 8	3	0.0	0.0	0.0	0.0	0.0	0.0 TO 0.0
GRP 9	3	4.3333	5.1316	2.9627	0.0	10.0000	-8.4144 TO 17.0811
GRP10	3	10.3333	9.7125	5.6075	2.0000	21.0000	-13.7942 TO 34.4609
TOTAL	30	3.6667	5.6650	1.0343	0.0	21.0000	1.5513 TO 5.7820

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .5231, P = .013 (APPROX.)
BARTLETT-BOX F = 1.601 , P = .148
MAXIMUM VARIANCE / MINIMUM VARIANCE 94.333

- O N E W A Y -

VARIABLE TIMES
BY VARIABLE DATABASE (8) DB8 (9) DB9 (10) DB10

MULTIPLE RANGE TEST

TUKEY-HSD PROCEDURE
RANGES FOR THE .050 LEVEL -

5.01 5.01 5.01 5.01 5.01 5.01 5.01 5.01 5.01

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
3.0028 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

MEAN	GROUP	G R P 1 7	G R P 8	G R P 5	G R P 2	G R P 3	G R P 4	G R P 9	G R P 1 0	G R P 6
0.0	GRP 1									
0.0	GRP 7									
0.0	GRP 8									
1.0000	GRP 5									
2.0000	GRP 2									
2.6667	GRP 3									
3.0000	GRP 4									
4.3333	GRP 9									
10.3333	GRP10									
13.3333	GRP 6	*	*	*	*					

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HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 1	GRP 7	GRP 8	GRP 5	GRP 2	GRP 3	GRP 4	GRP 9
MEAN	.0000	.0000	.0000	1.0000	2.0000	2.6667	3.0000	4.3333

GROUP	GRP10
MEAN	10.3333

SUBSET 2

GROUP	GRP 2	GRP 3	GRP 4	GRP 9	GRP10	GRP 6
MEAN	2.0000	2.6667	3.0000	4.3333	10.3333	13.3333

ONEWAY

VARIABLE TIMES
BY VARIABLE DATABASE (8) DB8 (9) DB9 (10) DB10

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

6.56 6.56 6.56 6.56 6.56 6.56 6.56 6.56 6.56

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
3.0028 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 1	GRP 7	GRP 8	GRP 5	GRP 2	GRP 3	GRP 4	GRP 9
MEAN	.0000	.0000	.0000	1.0000	2.0000	2.6667	3.0000	4.3333

GROUP	GRP10	GRP 6
MEAN	10.3333	13.3333

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Appendix 6.A204a

ANALYSIS OF VARIANCE OF USAGE BETWEEN SELECTED FULL-TEXT AND REFERENCE DATABASES IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRARIANS

```
02 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100
14:24:36     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2                                    PAGE   1

SPSS INC LICENSE NUMBER:  12087

                         NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE            FULL-TEXT AND REFERENCE DB USAGE
   2  0          TITLE               REPORTED BY LIBRARIANS
   3  0          FILE HANDLE      INDATA / NAME = 'FRUSDAL.'
   4  0          DATA LIST        FILE = INDATA
   5  0                           /1 FULLTEXT 21-22 REFERENC 31-32

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          FULLTEXT     1     21     22         F           2    0
          REFERENC     1     31     32         F           2    0

END OF DATALIST TABLE.

   6  0          CROSSTABS        TABLES = FULLTEXT BY REFERENC
   7  0          OPTIONS          3,5

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.

 ***** GIVEN WORKSPACE ALLOWS FOR  1360 CELLS WITH     2 DIMENSIONS FOR CROSSTAB PROBLEM *****
```


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CROSSTABULATION OF FULLTEXT BY REFERENC

FULLTEXT	REFERENC 2	18	21	ROW TOTAL
3			1	1
			100.0	33.3
			33.3	
10	1			1
	100.0			33.3
	33.3			
18		1		1
		100.0		33.3
		33.3		
COLUMN TOTAL	1	1	1	3
	33.3	33.3	33.3	100.0

NUMBER OF MISSING OBSERVATIONS = 0

PRECEDING TASK REQUIRED .23 SECONDS CPU TIME; 1.63 SECONDS ELAPSED.

```
8  0          T-TEST          PAIRS = FULLTEXT REFERENC
9  0          OPTIONS         3

***** T-TEST PROBLEM REQUIRES     30 WORDS OF WORKSPACE *****


THERE ARE    12386 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12386 WORDS.
```


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- T - T E S T -

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	(DIFFERENCE) MEAN	STANDARD DEVIATION	STANDARD ERROR	CORR.	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
FULLTEXT	3	10.3333	7.506	4.333	-3.3333	13.317	7.688	-.109	.931	-.43	2	.707
REFERENC		13.6667	10.214	5.897								


```
PRECEDING TASK REQUIRED        .11 SECONDS CPU TIME:        .74 SECONDS ELAPSED.
  10  0          FINISH

    10 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     4 SECONDS ELAPSED TIME.
       END OF JOB.
```


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Appendix 6.A204b

ANALYSIS OF VARIANCE OF USAGE BETWEEN SELECTED FULL-TEXT AND REFERENCE DATABASES IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
12:39:45    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
        PLOT - Scatter plots, overlay plots, contour plots on the printer.
  HILOGLINEAR - Fast loglinear analysis for hierarchical models.
      CLUSTER - Hierarchical cluster analysis.
QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
       PROBIT - Dichotomous probit and logistic regression analysis.
    SET WIDTH - Width control for printed output.
        XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           FULL-TEXT AND REFERENCE DB USAGE BY ENDUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'FRUSDAE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 FULLTEXT 20 REFERENC 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          FULLTEXT     1     20     20         F           1    0
          REFERENC     1     30     31         F           2    0

END OF DATALIST TABLE.


   5  0          CROSSTABS       TABLES = FULLTEXT BY REFERENC
   6  0          OPTIONS         3,5

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.

 ***** GIVEN WORKSPACE ALLOWS FOR  1360 CELLS WITH     2 DIMENSIONS FOR CROSSTAB PROBLEM *****
```


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CROSSTABULATION OF FULLTEXT BY REFERENC

FULLTEXT	REFERENC 2	19	34	ROW TOTAL
1	1 100.0 33.3			1 33.3
2			1 100.0 33.3	1 33.3
3		1 100.0 33.3		1 33.3
COLUMN TOTAL	1 33.3	1 33.3	1 33.3	3 100.0

NUMBER OF MISSING OBSERVATIONS = 0


```
PRECEDING TASK REQUIRED          .23 SECONDS CPU TIME;       1.91 SECONDS ELAPSED.

   7  0          T-TEST          PAIRS = FULLTEXT REFERENC
   8  0          OPTIONS         ;

  ***** T-TEST PROBLEM REQUIRES      30 WORDS OF WORKSPACE *****


THERE ARE    12386 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12386 WORDS.
```


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- T - T E S T -

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	(DIFFERENCE) MEAN	STANDARD DEVIATION	STANDARD ERROR	2-TAIL CORR.	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
FULLTEXT	3	2.0000	1.000	.577	-16.3333	15.503	8.950	.531	.644	-1.82	2	.210
REFERENC		18.3333	16.010	9.244								


```
PRECEDING TASK REQUIRED        .11 SECONDS CPU TIME:        .72 SECONDS ELAPSED.
   $  O          FINISH

     5 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     4 SECONDS ELAPSED TIME.
       END OF JOB.
```


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Appendix 6.A205a .

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS AGE GROUPS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRARIANS

```
02 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE    1
15:48:43     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY AGE, LIBRARIANS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSAGL.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 AGE 21 TIMES 31-35(2)

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          AGE          1     21     21          F           1    0
          TIMES        1     31     35          F           5    2

END OF DATALIST TABLE.

   5  0          VAR LABELS      AGE (1) 0-20 (2) 21-35 (3) 36-55 (4) 56 +
   6  0          ONEWAY          TIMES BY AGE(1,4)/
   7  0                          RANGES = TUKEY/
   8  0                          RANGES = SCHEFFE/
   9  0          OPTIONS         6
  10  0          STATISTICS      1,3

     104 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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Appendix 6.A205b

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS AGE GROUPS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE    1
14:56:45     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY AGE, ENDUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSAGE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 AGE 20 TIMES 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          AGE          1     20     20          F           1    0
          TIMES        1     30     31          F           2    0

END OF DATALIST TABLE.


   5  0          VAR LABELS      AGE (1) 0-20 (2) 21-35 (3) 36-55
   6  0          ONEWAY          TIMES BY AGE(1,3)/
   7  0                          RANGE = TUKEY/
   8  0                          RANGE = SCHEFFE/
   9  0          OPTIONS         6
  10  0          STATISTICS      1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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@SPSS-X

Appendix 6.A206a

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS EDUCATIONAL LEVELS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRARIANS

```
02 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE   1
16:37:25    GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY EDUCATION, LIBRARIANS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSEDL.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 EDUCATN 20 TIMES 30-34(2)

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          EDUCATN      1     20     20         F           1    0
          TIMES        1     30     34         F           5    2

END OF DATALIST TABLE.

   5  0          VAR LABELS
   6  0                          EDUCATN (1) HISCHOOL (2) COLLEGE (3) GRADUATE
   7  0          ONEWAY          TIMES BY EDUCATN(1,3)/
   8  0                          RANGES = TUKEY/
   9  0                          RANGES = SCHEFFE/
  10  0          OPTIONS         6
  11  0          STATISTICS      1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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Appendix 6.A206b

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS EDUCATIONAL LEVELS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100
14:34:06     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2                    PAGE    1

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY EDUCATION, EDUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSEDE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /COLLEGE 20 GRADUATE 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          COLLEGE      1     20     20          F           1    0
          GRADUATE     1     30     31          F           2    0

END OF DATALIST TABLE.

   5  0          CROSSTABS       TABLES = COLLEGE BY GRADUATE
   6  0          OPTIONS         3,5

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.

 ***** GIVEN WORKSPACE ALLOWS FOR  1360 CELLS WITH     2 DIMENSIONS FOR CROSSTAB PROBLEM *****
```


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CROSSTABULATION OF COLLEGE BY GRADUATE PAGE 1 OF 1

COLLEGE	GRADUATE 0	3	5	8	9	13	31	39	ROW TOTAL
0	COUNT	3	1	1	1	1	1		8
	ROW PCT	37.5	12.5	12.5	12.5	12.5	12.5		80.0
	TOT PCT	30.0	10.0	10.0	10.0	10.0	10.0		
1	COUNT		1					1	2
	ROW PCT		50.0					50.0	20.0
	TOT PCT		10.0					10.0	
COLUMN TOTAL		3	1	1	1	1	1	1	10
		30.0	10.0	10.0	10.0	10.0	10.0	10.0	100.0

NUMBER OF MISSING OBSERVATIONS = 0


```
PRECEDING TASK REQUIRED        .29 SECONDS CPU TIME;       1.77 SECONDS ELAPSED.

   7  0          T-TEST          PAIRS = COLLEGE GRADUATE
   8  0          OPTIONS         3

  ***** T-TEST PROBLEM REQUIRES      30 WORDS OF WORKSPACE *****


THERE ARE    12386 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS     12386 WORDS.
```


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T-TEST

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	(DIFFERENCE) MEAN	STANDARD DEVIATION	STANDARD ERROR	CORR.	2-TAIL PROB.	T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
COLLEGE	10	.2000	.422	.133	-10.6000	13.418	4.243	.434	.210	-2.50	9	.034
GRADUATE		10.8000	13.596	4.299								

PRECEDING TASK REQUIRED .12 SECONDS CPU TIME; .67 SECONDS ELAPSED.

```
  9  0          FINISH

    9 COMMAND LINES READ.
    0 ERRORS DETECTED.
    0 WARNINGS ISSUED.
    1 SECONDS CPU TIME.
    4 SECONDS ELAPSED TIME.
      END OF JOB.
```


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IO STATUS   000000000006 WRITING EOF

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```

Appendix 6.A207a

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS OCCUPATIONS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY LIBRARIANS

```
02 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
17:15:55     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY OCCUPATION. LIBRARIANS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSOCL.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 OCCUPAT 20 TIMES 30-34(2)

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          OCCUPAT      1     20     20          F           1    0
          TIMES        1     30     34          F           5    2

END OF DATALIST TABLE.


   5  0          VAR LABELS      OCCUPAT (1) FACULTY (2) PROFESSIONAL
   6  0                          OCCUPAT (3) STUDENT (4) OTHER
   7  0          ONEWAY          TIMES BY OCCUPAT(1,4)/
   8  0                          RANGES = TUKEY/
   9  0                          RANGES = SCHEFFE/
  10  0          OPTIONS         6
  11  0          STATISTICS      1,3

     104 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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ONEWAY

VARIABLE TIMES
BY VARIABLE OCCUPAT (3) STUDENT (4) OTHER

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	3	298.2521	99.4174	3.7951	.0184
WITHIN GROUPS	36	943.0687	26.1964		
TOTAL	39	1241.3208			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN	
GRP 1	10	3.0680	3.9064	1.2353	0.0	11.4400	.2736 TO	5.8624
GRP 2	10	1.2980	1.6527	.5226	0.0	4.8400	.1157 TO	2.4803
GRP 3	10	7.3160	9.3151	2.9457	0.0	27.2800	.6524 TO	13.9796
GRP 4	10	.1180	.1502	.0475	0.0	.4400	.0105 TO	.2255
TOTAL	40	2.9500	5.6417	.8920	0.0	27.2800	1.1457 TO	4.7543

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .8281, P = .000 (APPROX.)
BARTLETT-BOX F = 25.617 , P = .000
MAXIMUM VARIANCE / MINIMUM VARIANCE 3844.000

ONEWAY

VARIABLE TIMES
BY VARIABLE OCCUPAT (3) STUDENT (4) OTHER

MULTIPLE RANGE TEST

TUKEY-HSD PROCEDURE
RANGES FOR THE .050 LEVEL -

3.81 3.81 3.81

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
3.6191 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

	G R P 4	G R P 2	G R P 1	G R P 3
	4	2	1	3
MEAN	GROUP			
.1180	GRP 4			
1.2980	GRP 2			
3.0680	GRP 1			
7.3160	GRP 3	*		

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 4	GRP 2	GRP 1
MEAN	.1180	1.2980	3.0680

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SUBSET 2

GROUP	GRP 2	GRP 1	GRP 3
MEAN	1.2980	3.0680	7.3160

- O N E W A Y -

VARIABLE TIMES
BY VARIABLE OCCUPAT (3) STUDENT (4) OTHER

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

4.15 4.15 4.15

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
3.6191 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

	G R P 4	G R P 2	G R P 1	G R P 3
MEAN	GROUP			
.1180	GRP 4			
1.2980	GRP 2			
3.0680	GRP 1			
7.3160	GRP 3	*		

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 4	GRP 2	GRP 1
MEAN	.1180	1.2980	3.0680

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SUBSET 2

GROUP	GRP 2	GRP 1	GRP 3
MEAN	1.2980	3.0680	7.3180


```
PRECEDING TASK REQUIRED        .95 SECONDS CPU TIME;       2.49 SECONDS ELAPSED.
  12  0          FINISH

    12 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     4 SECONDS ELAPSED TIME.
       END OF JOB.
```


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Appendix 6.A207b

ANALYSIS OF VARIANCE OF ONLINE DATABASE USAGE AMONG VARIOUS OCCUPATIONS OF USERS IN THREE SELECTED LIBRARIES DATA REPORTED BY ENDUSERS

```
03 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                                    PAGE    1
15:48:41     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           ONLINE USAGE BY OCCUPATION, ENDUSERS
   2  0          FILE HANDLE     INDATA / NAME = 'OLUSOCE.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 OCCUPAT 20 TIMES 30-31

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          OCCUPAT      1     20     20         F           1    0
          TIMES        1     30     31         F           2    0

END OF DATALIST TABLE.


   5  0          VAR LABELS      OCCUPAT (1) LIBRARIAN
   6  0                          OCCUPAT (2) DOCTORAL FACULTY
   7  0                          OCCUPAT (3) MASTERS' FACULTY
   8  0                          OCCUPAT (4) UNDERGRADUATE FACULTY
   9  0                          OCCUPAT (5) GRADE SCHOOL FACULTY
  10  0                          OCCUPAT (6) DOCTORAL STUDENT
  11  0                          OCCUPAT (7) MASTER'S STUDENT
  12  0                          OCCUPAT (8) UNDERGRADUATE STUDENT
  13  0          ONEWAY          TIMES BY OCCUPAT(1,8)/
  14  0                          RANGES = TUKEY/
  15  0                          RANGES = SCHEFFE/
  16  0          OPTIONS         6
  17  0          STATISTICS      1,3

     200 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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SUBSET 2

GROUP	GRP 7	GRP 8
MEAN	2.1000	6.3000

- O N E W A Y -

VARIABLE TIMES
BY VARIABLE OCCUPAT (3) UNDERGRADUATE STUDENT

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

5.47 5.47 5.47 5.47 5.47 5.47 5.47

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
2.1415 * RANGE * DSQRT(1/N(I) + 1/N(J))

(*) DENOTES PAIRS OF GROUPS SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

MEAN	GROUP	G R P 3	G R P 2	G R P 5	G R P 8	G R P 1	G R P 4	G R P 7	G R P 6
.1000	GRP 3								
.2000	GRP 2								
.2000	GRP 5								
.2000	GRP 8								
.7000	GRP 1								
1.2000	GRP 4								
2.1000	GRP 7								
6.3000	GRP 6	*	*	*	*	*	*		

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, WHOSE HIGHEST AND LOWEST MEANS DO NOT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	GRP 3	GRP 2	GRP 5	GRP 8	GRP 1	GRP 4	GRP 7
MEAN	.1000	.2000	.2000	.2000	.7000	1.2000	2.1000

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SUBSET 2

GROUP	GRP 4	GRP 7	GRP 6
MEAN	1.2000	2.1000	6.3000

PRECEDING TASK REQUIRED 1.23 SECONDS CPU TIME: 3.32 SECONDS ELAPSED.

18 0 FINISH

18 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
1 SECONDS CPU TIME.
5 SECONDS ELAPSED TIME.
END OF JOB.

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Appendix 6.A208

ANALYSIS OF VARIANCE OF USERS' SATISFACTION WITH SELECTED ONLINE DATABASES AMONG VARIOUS AGE GROUPS OF USERS IN THREE SELECTED LIBRARIES

```
04 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
13:30:27    GEORGIA STATE UNIVERSITY       UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           USERS' SATISFACTION BY AGE
   2  0          FILE HANDLE     INDATA / NAME = 'SATISAG.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 AGE 20 SATISF 30

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          AGE          1     20     20         F           1    0
          SATISF       1     30     30         F           1    0

END OF DATALIST TABLE.

   5  0          VAR LABELS      AGE (1) 0-20 (2) 21-35 (3) 36-55
   6  0          ONEWAY          SATISF BY AGE(1,3)/
   7  0                          RANGES = TUKEY/
   8  0                          RANGES = SCHEFFE/
   9  0          OPTIONS         6
  10  0          STATISTICS      1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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ONEWAY

VARIABLE SATISF
BY VARIABLE AGE (1) 0-20 (2) 21-35 (3) 36-55

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	4.2706	2.1353	.7326	.4900
WITHIN GROUPS	27	78.6961	2.9147		
TOTAL	29	82.9667			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
GRP 1	5	5.2000	2.5884	1.1576	2.0000	8.0000	1.5881 TO 8.4139
GRP 2	11	6.2727	1.9540	.5892	2.0000	8.0000	4.9600 TO 7.5855
GRP 3	14	6.1429	1.0271	.2745	4.0000	8.0000	5.5498 TO 6.7359
TOTAL	30	6.0333	1.6914	.3088	2.0000	8.0000	5.4017 TO 6.6649

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .5789, P = .097 (APPROX.)
BARTLETT-BOX F = 3.389 , P = .034
MAXIMUM VARIANCE / MINIMUM VARIANCE 6.351

ONEWAY

VARIABLE SATISF
BY VARIABLE AGE (1) 0-20 (2) 21-35 (3) 36-55

MULTIPLE RANGE TEST

TUKEY-HSD PROCEDURE
RANGES FOR THE .050 LEVEL -

3.50 3.50

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
1.2072 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

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@SPSS-X

Appendix 6.A209

ANALYSIS OF VARIANCE OF USERS' SATISFACTION WITH SELECTED ONLINE DATABASES AMONG VARIOUS EDUCATIONAL LEVELS OF USERS IN THREE SELECTED LIBRARIES

```
03 JUN 88   SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
17:03:28    GEORGIA STATE UNIVERSITY      UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
        For more details, use the command:  INFO OVERVIEW FACILITIES.
        PLOT - Scatter plots, overlay plots, contour plots on the printer.
  HILOGLINEAR - Fast loglinear analysis for hierarchical models.
     CLUSTER - Hierarchical cluster analysis.
QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
      PROBIT - Dichotomous probit and logistic regression analysis.
   SET WIDTH - Width control for printed output.
       XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           USERS' SATISFACTION BY EDUCATION
   2  0          FILE HANDLE     INDATA / NAME = 'SATISED.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 EDUCATN 20 SATISF 30

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          EDUCATN      1     20     20         F           1    0
          SATISF       1     30     30         F           1    0

END OF DATALIST TABLE.

   5  0          VAR LABELS      EDUCATN (1) COLLEGE (2) MASTER'S (3) DOCTORAL
   6  0          ONEWAY          SATISF BY EDUCATN(1,3)/
   7  0                          RANGES = TUKEY/
   8  0                          RANGES = SCHEFFE/
   9  0          OPTIONS         6
  10  0          STATISTICS      1,3

      80 WORDS OF MEMORY REQUIRED FOR ONEWAY PROCEDURE.

THERE ARE    12248 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12248 WORDS.
```


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- - - -

- O N E W A Y -

VARIABLE SATISF
BY VARIABLE EDUCATN (1) COLLEGE (2) MASTER'S (3) DOCTORAL

MULTIPLE RANGE TEST

SCHEFFE PROCEDURE
RANGES FOR THE .050 LEVEL -

3.68 3.68

THE RANGES ABOVE ARE TABLE RANGES.
THE VALUE ACTUALLY COMPARED WITH MEAN(J)-MEAN(I) IS..
1.2057 * RANGE * DSQRT(1/N(I) + 1/N(J))
NO TWO GROUPS ARE SIGNIFICANTLY DIFFERENT AT THE .050 LEVEL

PRECEDING TASK REQUIRED .72 SECONDS CPU TIME; 2.49 SECONDS ELAPSED.

11 0 FINISH

11 COMMAND LINES READ.
0 ERRORS DETECTED.
0 WARNINGS ISSUED.
1 SECONDS CPU TIME.
4 SECONDS ELAPSED TIME.
END OF JOB.

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@SPSS-X

Appendix 6.A210

ANALYSIS OF VARIANCE OF USERS' SATISFACTION WITH SELECTED ONLINE DATABASES BETWEEN TWO OCCUPATIONAL GROUPS OF USERS IN THREE SELECTED LIBRARIES

```
04 JUN 88    SPSS-X RELEASE 2.0A-UW1.0 FOR SPERRY 1100                    PAGE    1
15:02:00     GEORGIA STATE UNIVERSITY        UNISYS 1100/70H2

SPSS INC LICENSE NUMBER:  12087

                    NEW FEATURES IN SPSS-X RELEASE 2
          For more details, use the command:  INFO OVERVIEW FACILITIES.
          PLOT - Scatter plots, overlay plots, contour plots on the printer.
   HILOGLINEAR - Fast loglinear analysis for hierarchical models.
       CLUSTER - Hierarchical cluster analysis.
 QUICK CLUSTER - Fast cluster analysis for a fixed number of clusters.
 IMPORT/EXPORT - Portable system files for transfer to other kinds of computers.
        PROBIT - Dichotomous probit and logistic regression analysis.
     SET WIDTH - Width control for printed output.
         XSAVE - Allows new flexibility in saving system files.
END subcommand - With DATA LIST, you can detect end of file.

   1  0          TITLE           USERS' SATISFACTION BY OCCUPATION
   2  0          FILE HANDLE     INDATA / NAME = 'SATISOC.'
   3  0          DATA LIST       FILE = INDATA
   4  0                          /1 OCCUPAT 20 SATISF 30

THE ABOVE DATA LIST STATEMENT WILL READ   1 RECORDS FROM FILE INDATA  .

          VARIABLE   REC  START    END         FORMAT  WIDTH  DEC

          OCCUPAT      1     20     20          F           1    0
          SATISF       1     30     30          F           1    0

END OF DATALIST TABLE.

   5  0          VAR LABELS      OCCUPAT, OCCUPATION/
   6  0                          SATISF, SATISFACTION/
   7  0          VALUE LABLES    OCCUPAT (1) FACULTY (2) STUDENT
   8  0          T-TEST          GROUPS = OCCUPAT/ VARIABLES = SATISF
   9  0          OPTIONS         3

  ***** T-TEST PROBLEM REQUIRES     30 WORDS OF WORKSPACE *****


THERE ARE    12214 WORDS OF MEMORY AVAILABLE.
THE LARGEST CONTIGUOUS AREA HAS    12214 WORDS.
```


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- T - T E S T -

GROUP 1 - OCCUPAT EQ 1.
GROUP 2 - OCCUPAT EQ 2.

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	POOLED VARIANCE ESTIMATE DEGREES OF FREEDOM	POOLED VARIANCE ESTIMATE 2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	SEPARATE VARIANCE ESTIMATE DEGREES OF FREEDOM	SEPARATE VARIANCE ESTIMATE 2-TAIL PROB.
SATISF												
GROUP 1	9	5.7778	1.563	.521	1.28	.752	-.54	28	.597	-.56	17.12	.581
GROUP 2	21	6.1429	1.769	.385								


```
PRECEDING TASK REQUIRED        .31 SECONDS CPU TIME;       1.19 SECONDS ELAPSED.
  10  0          FINISH

    10 COMMAND LINES READ.
     0 ERRORS DETECTED.
     0 WARNINGS ISSUED.
     1 SECONDS CPU TIME.
     3 SECONDS ELAPSED TIME.
       END OF JOB.
```


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