

---

How Lawyers Search when No-one is Looking :  
A Transaction Log Analysis to Evaluate  
the Educational Needs of the Legal Profession

---

by

Karlene Michelle Robinson

---

To be submitted to the  
School of Communications and Information Management,  
Victoria University of Wellington  
in partial fulfillment of the requirements for the degree of  
Masters of Library and Information Studies

15 February 1998

---

## **Acknowledgments**

Tony Patterson from Wordstream Corporation Limited of Christchurch, New Zealand for writing and supplying the transaction logging software.

Helga Arlington, Librarian at the Auckland District Law Society Library for use of the Library facilities.

Alastair Smith of the School of Communications and Information Management for guidance and support provided throughout the duration of this project.

Reece Robinson for invaluable expertise in data transfer and analysis using Microsoft Access, as well as emotional support throughout the project and the Masters of Library and Information Studies course.

## **Contents**

<b><u>ACKNOWLEDGMENTS</u></b>	<b><u>2</u></b>
<b><u>CONTENTS</u></b>	<b><u>3</u></b>
<b><u>ABSTRACT</u></b>	<b><u>4</u></b>
<b><u>INTRODUCTION</u></b>	<b><u>6</u></b>
<b><u>BACKGROUND</u></b>	<b><u>8</u></b>
<b><u>LITERATURE REVIEW</u></b>	<b><u>10</u></b>
<b><u>METHODOLOGY</u></b>	<b><u>19</u></b>
<b><u>RESULTS</u></b>	<b><u>20</u></b>
<b><u>DISCUSSION</u></b>	<b><u>38</u></b>
<b><u>RECOMMENDATIONS</u></b>	<b><u>42</u></b>
<b><u>CONCLUSION</u></b>	<b><u>44</u></b>
<b><u>BIBLIOGRAPHY</u></b>	<b><u>45</u></b>
<b><u>APPENDIX ONE</u></b>	<b><u>50</u></b>

## **Abstract**

Keywords: Lawyers and the Legal Profession; Transaction Log Analysis; Computers & On-line Databases; Training & Education

Lawyers are increasingly responsible for conducting research using legal databases and are looking to law librarians for training. As there is little information regarding law practitioner training, and even less which provides information about the actual search behaviour of the legal profession, much of this training has had to be based upon experience and best guesses of individual librarians.

This study was undertaken to investigate the actual search behaviour of practitioners using the Auckland District Law Society Library. Its purpose is to provide the training personnel in that library with information about the search habits of their potential trainees to improve current training initiatives.

It is based on data from transaction logs gathered from the public terminals in the Auckland District Law Society Library which are used by practitioners. An analysis of the logs collected revealed that: (1) the case summary databases, LINX and BRIEFCASE, were the databases most commonly used by practitioners; (2) the most common type of search conducted during the study was for commentary or case law on a particular subject; (3) the majority of search sessions comprised only a single query, but there were some instances where practitioner sessions would involve more than 10 queries; and (4) there was limited use of any of the advanced search features offered on FolioVIEWS.

Based upon these findings the following recommendations were made in relation to the existing training programme offered by the Library:

1. All training sessions include information regarding database concepts;
2. The library initiate additional lunch-time training sessions to inform practitioners of the databases currently available in the library and their content;

3. The library continue to teach advanced search techniques, particularly search construction, the use of synonyms and truncation, to help increase the levels of recall and therefore search success in practitioner searches;
4. The library continue to include information on Field and Phrase searching in both the beginners and advanced courses.

Although the purpose of the study was not to investigate the level of search ‘failure’ or ‘success’ attained by practitioners, this paper contains a discussion of the different measurement techniques which could be used to measure search effectiveness. It is argued that recall would be the most appropriate measure of search success and that, based upon a visual examination of the transaction logs, this is not being achieved in the majority of cases. Given this alarming observation it is argued that more attention should be paid to issues surrounding database and interface design and that the library become involved in a general education programme to help users recognise situations in which end-user searches may be inappropriate.

## Introduction

In the legal environment, as in many other professions, information seekers are being encouraged to satisfy their information needs directly through the use of a variety of information retrieval systems”<sup>i</sup>. One reason postulated for the recent growth in end-user searching is increase in availability of CD-ROMs and their fixed costs<sup>ii</sup>.

As a result of this increase in end-user searching, law librarians are increasingly responsible for training legal practitioners on how to use databases effectively for legal research. This is a critical role, given the importance of legal research in a law practice and the risk of negligence should critical cases or legislation be missed.

Despite this, there is very little literature available on what kinds of searches legal practitioners typically do and what the most common gaps in their searching knowledge actually are. Without this information, the training process has had to be based on the assumptions of individual trainers. More information is required so that training can be more focused and targeted to actual practitioner need.

This study has been conducted to provide actual data relating to the search behaviour of practitioners using the public terminals at the Auckland District Law Society Library to further develop the documentation and training programmes currently being offered by the Law Society. It is hoped that this information may also be of some assistance to other law librarians involved in the development of practitioner training programmes.

The study had the following data collection objectives:

1. To establish usage patterns for the databases currently hosted on the public PCs in the Auckland District Law Society Library.
2. To establish the types of searches being executed by practitioners (eg: for material relating to a particular legislative provision, for cases by subject, or for a particular case).

3. To investigate the searching behaviour of legal practitioners with respect to the number of queries typically making up a particular search session.
4. To investigate the use of specific search techniques (eg: searching for subsections of acts, truncation, use of synonyms/alternatives).

## Background

The Auckland District Law Society Library is a substantial private research library funded through practice fees paid to the Society by practitioners working in the greater Auckland, Northland and Waikato regions.

The library is staffed during normal business hours and four evenings per week. Practitioners have twenty-four hour access to the library with personalised after-hours door cards.

Although all lawyers practising in the Auckland region are entitled to use the Library it is used primarily by barristers, sole practitioners and solicitors in small to medium-sized firms. Many of the larger law firms maintain in-house library collections with qualified library staff, and practitioners from these firms use the library less frequently.

The library has a growing number of electronic legal databases which are freely available to practitioners through three public terminals (refer listing in Appendix One). These databases comprise both abstract databases, which contain summaries of relevant cases or articles, and full-text databases, which contain the full text of legislation, textbooks and case law.

Almost all of the databases currently available to library patrons are searched using FolioVIEWS database software. FolioVIEWS provides two search facilities. The first, template searching, facilitates field searching by providing users with a search 'form' setting out the different database fields and space where users may enter their search terms for specified fields. The second, query searching, is the interface for global searches where searching is not restricted to particular fields. FolioVIEWS facilitates the full use of Boolean logic with 'AND' being the default connector used by all databases. The software does not facilitate the building of searches in sets. However, it is possible for users to subsequently add or delete from previous searches by retrieving the search and modifying it.

Two FolioVIEWS training programmes have been established by the library staff and are available to practitioners at an additional cost. The first course, titled "An



Introduction to FolioVIEWS”, is a confidence building course which focuses on the LINX database and introduces trainees to the basics of computing, template searching, navigating and printing results. This course is priced at \$60.00 and takes 45-60 minutes. The second course, titled “Effective Searching Using FolioVIEWS”, is designed for individuals who have had some experience in computer searching. It goes over the databases provided by the library, template searching, advanced Boolean search techniques using the Query Template, as well as navigating and printing results. This course is priced at \$150.00 and takes between 90-120 minutes.

These courses have been designed on the basis of the following assumptions: (1) That practitioners are interested primarily in searching for cases with similar fact situations, cases which discuss a particular statutory provision or cite a particular case; (2) That practitioners seek to search efficiently so that less searches are required to find particular information and (3) That the majority of practitioners have little or no understanding regarding important search tools such as Boolean, truncation and the use of alternatives or synonyms.

In addition to the training programmes, the library has developed a Computer Bench Book to assist practitioners when no staff are available. This manual has the following sections (1) Overview of the databases available in the Library; (2) Search Options and Sample Searches; (3) Navigating Search Results & Retrieving old searches; (4) Printing; (5) Help.

The Auckland District Law Society was interested in obtaining information regarding the actual search behaviour of law society members to improve the courses and documentation currently being offered and this study was undertaken as a result.

## Literature Review

### *Training in Computerised Databases*

There are a number of articles which have been written recently regarding the use of, and training in, computerised databases. Only a few have been dedicated specifically to the teaching of Computer Aided Legal Research (CALR) and these have mainly been prepared by WESTLAW & LEXIS (the leading providers of legal information in the United States)<sup>iii</sup>.

There is a single New Zealand article written on the subject<sup>iv</sup>. In it Mary Kelly argues that there is an uneven lack of quality training and that this is a serious problem in this country<sup>v</sup>. Although her article is brief, she does present a number of practical training ideas which are echoed in the international literature.

Kelly suggests that the first step in any training course is to outline the content of databases as the choice of database is an extremely important factor in making effective use of computer technology<sup>vi</sup>. The importance of choosing an appropriate database and being familiar with its content has been highlighted by a number of writers in both the legal<sup>vii</sup> and general<sup>viii</sup> contexts.

Once a decision has been made to search for a particular legal database, Mary Kelly states that appropriate retrieval techniques must be learned to ensure a successful result<sup>ix</sup>. A model for teaching search construction is briefly presented, which is consistent with models outlined by two other writers in the area - Jon Bing<sup>x</sup> (who presents a conceptor-based retrieval system) and Silverstein<sup>xi</sup> (who presents an index model for training). Each of these writers advocate teaching search construction as a three step process. The process is outlined using an example problem whereby a client has been attacked and injured by dog, and a search is required to establish the liability of the owner.

The first step in each of these models is to identify the ideas or concepts which are critical to the search. In his 'index model', Silverstein introduces the concept of "being your own indexer" and encourages trainees to create the index divisions which

suit their research needs<sup>xii</sup>. Bing simply calls this phase ‘generating IDEAS’. These essential concepts can relate to either the legal or factual elements of the problem<sup>xiii</sup>.

#### CONCEPTS:

dog + liability + Personal Injury

The second step in the models is to identify any synonyms or alternatives for each of the essential concepts. Each of the authors considered this to be a critical phase in training and search construction. Kelly stated that special attention should be given to synonyms and analogous words as this had the potential to yield additional relevant documents which might not otherwise be found<sup>xiv</sup>. Silverstein presents specific guidelines to assist in the selection of alternatives stating that they may be either vertical (which include more general or more specific alternatives to the query term eg: vertical terms for ‘Asprin’ would include more general terms such as ‘medicine’ or ‘prescription’ or a more specific terms such as the product name ‘Bayer’)<sup>xv</sup> or horizontal (which include synonyms and antonyms to the query term eg: horizontal terms for ‘Minor’ would include synonyms such as ‘juvenile’, ‘infant’, ‘child’, and ‘underage’)<sup>xvi</sup> and that manual research can be invaluable in defining the appropriate terms. Bing describes this as looking for WORDS which can be used to represent those ideas

#### ALTERNATIVES:

dog = canine, puppy, Doberman, German shepherd, Pitbull

The final step is to translate the essential terms and their alternatives into language specific to the particular system, using tools such as Boolean, truncation and proximity. In fact, Silverstein presents this as two separate phases. The first phase he called ‘dealing with each term on an individual basis’ and this involved adding plurals, using wildcards, and truncation. The second phase he called ‘dealing with each term on a relational basis’ and this involved adding connectors and proximity.

#### FINAL SEARCH :

(dog\* or canine\* or puppy\* or Doberman or “German shepherd” or Pitbull) and liab\* and “personal injury”

A more complex model for teaching Computer Aided Legal Research to law students was presented by Morse & Pao in their article “A Decision Tree for End User

Searching in a Large Interactive Legal Database”. However, they also suggest decomposing the search into its component concepts<sup>xvii</sup>.

Despite the apparent consensus on this approach to training legal practitioners, Bing does note that it is not without problems:

One should notice, however, that although this strategy is quite straightforward and user response is favorable (lawyers seem inclined to this sort of scanning of a problem), it is rather cumbersome to specify such a request in the search language of most systems. It generally presumes the use of parenthesis, specifying a long string of disjunctive search terms within each parenthesis and combining these with conjunctions. It is also generally difficult to return to a former segment of a request, adding a further synonym to one of the synonym sets.<sup>xviii</sup>

In another article on the subject of lawyer training, Edward Jacobs<sup>xix</sup> emphasises that any training session should begin with a background lecture which sets out a framework for searching which defines databases and covers their structure and terminology. This emphasis on providing a conceptual framework in training has been an almost universal preoccupation in the general on-line training literature. The importance of ‘conceptual training’ (which explains databases, bibliographic records, fields, access points and how to divide a topic into component parts for search strategy) in addition to ‘procedural training’ (which covers specific skills such as logging on and off the system, keyboard mechanics, Input and output procedures) is most strongly advocated by Baker & Sandore who state that “research on how users can perform complex searches using on-line systems suggests that step-by-step procedural instructions that emphasise the mechanics of searching are inadequate a foundation for effective technology use”<sup>xx</sup>. It is argued that such cognitive knowledge about a system can enhance a user’s searching ability<sup>xxi</sup>, facilitate transferability of skills between different search systems and assists trainees with error diagnosis<sup>xxii</sup>. Similar sentiments have been expressed by a number of other authors<sup>xxiii</sup>.

Jacobs also argues that all courses should include follow-up documentation. He notes that ‘there is a mass of detail which the students will at some stage need to absorb and the lecture is probably not the best way to convey that amount of detail’ and suggests the provision of a handbook<sup>xxiv</sup>.

Finally, he emphasises the need for hands-on practice as a way for students to be able to judge whether or not they have grasped the basics. It is suggested that any hands on experience follow as close as possible after the introductory lecture so that the points made are not “lost in the recesses of students minds”<sup>xxv</sup>. This call for ‘hands-on experience’ is also prevalent in the general training literature. Baker & Sandore note that it has been found that students who were provided with a workshop session performed significantly better on the tests than those who had no training or those who received only printed instructional materials<sup>xxvi</sup>. Also called for by Ala & Cerebona in their article “Boolean Searches - A Life Skill” where they state that students need a hands-on experience following a formal lesson<sup>xxvii</sup>.

Teresa Pritchard-Schoch “Teaching On-line Legal Research” presents a series of articles on training US Law Students on LEXIS and WESTLAW. As these databases are used primarily by librarians rather than practitioners here, the specifics presented are not relevant to the New Zealand context. However, she did make the important observation that highlighting the importance of investing the time in training can be made difficult when ‘novice researchers sometimes get lucky with a rough, poorly constructed search, and then consider themselves masters of the system they used’<sup>xxviii</sup>. The difficulties in getting patrons to learn on-line systems appears to be a universal problem which also received attention in the more general literature<sup>xxix</sup>. Some writers suggest that it is so difficult to get attendance and teach good research skills that the focus should be on designing better interfaces<sup>xxx</sup>. In fact, many authors appear to be recommend either improving bibliographic Records, enhancing search capabilities and improving interfaces as alternatives to training<sup>xxxi</sup>.

### ***Exploring actual search behaviour***

Of the articles on training legal practitioners, not one considered the actual search behaviour of the profession and either the searches performed most often or the errors which occur most frequently.

Despite the fact that research about on-line searching has increased over recent years<sup>xxxii</sup> there do not yet appear to have been many studies which study search behaviour in the legal environment. In fact, the research undertaken for this paper

revealed only three studies conducted on the search behaviour of lawyers and legal staff.

The first, conducted by Alice J Vollaro & Donald T Hawkins<sup>xxxiii</sup>, was a survey of a group of patent attorneys conducting their own searches on DIALOG. They found that the average search time was longer for practitioners to execute their own searches as opposed to gaining the assistance of a library professional (specifically they found that two attorneys averaged two hours to perform a search, that six attorneys took between 40 and 60 minutes and that two attorneys took 15 minutes or less)<sup>xxxiv</sup>. They asked what difficulties the attorneys were having with their searches and found that they had trouble in finding the appropriate search terms (particularly when the items retrieved were not what they initially expected), remembering the special features of each database (especially when use was infrequent), not knowing when all possible avenues had been pursued, forgetting commands and inadequate search strategies<sup>xxxv</sup>. The study also investigated why practitioners chose to search directly, rather than use an intermediary, and found convenience, flexibility and time were given as the major reasons. They concluded that there were ‘trade-offs of time, convenience, and comprehensiveness’ when the attorneys chose to do the research themselves.

The second study was conducted by Rosalie Sanderson to investigate the use of the DIALOG search system by law students at the University of Florida<sup>xxxvi</sup>. The study found that, although the menu system employed to search DIALOG was useful, it was important that students receive training to ‘set the stage’ and ensure that they are able to use the system efficiently<sup>xxxvii</sup>. They concluded that the idea that a lawyer can sit in front of a personal computer and identify all relevant authorities with no training is ludicrous<sup>xxxviii</sup>.

The final study, conducted by Weijiang Yuan<sup>xxxix</sup>, considered the use of QUICKLAW (a major full-text online information retrieval system in Canada) by law students over a one year period, to see the effects of experience on searching. The study measured factors such as command repertoire, language usage patterns, error patterns, search speed and attitude and found that experience had positive effects on end-user

repertoires of commands and features. However, the study also noted that error rates did not always decrease with an increase in experience.

More commonly, studies appearing in the literature explored the search behaviour of University students using the OPAC<sup>xi</sup>, high school Students<sup>xli</sup>, or medical students and practitioners<sup>xlii</sup>. Most of these studies were based on systems which rely on controlled subject searching or keyword searching and consider the percentage of patrons which utilise this facility<sup>xliii</sup>. Many of these studies have concluded that controlled subject searching is one of the greatest problems faced by users as the majority are unfamiliar with the Library of Congress or medical subject headings and prefer to search for subjects in a more natural language<sup>xliiv</sup>. This is a less relevant consideration for legal databases currently available in New Zealand which are either full-text or abstract based and provide only limited subject headings which are not critical to search success.

A summary of other common search problems highlighted by the non-legal literature is presented by Christine Borgman<sup>xliv</sup>. Borgman's comprehensive paper groups study findings into mechanical and conceptual problems encountered by users. The mechanical difficulties highlighted in the study include logging on and off systems, typographical errors, a lack of understanding of search commands and misspelling of search terms. The conceptual difficulties highlighted in the study include the incorrect use of Boolean or truncation, not including synonyms, using only the most basic techniques of selecting and combining terms, the rare use of advanced features (such as truncation) and difficulty in expanding and narrowing initial search results. At the conclusion of the review, Borgman identifies two themes throughout the literature: "people have difficulty in understanding how to implement their questions in terms of the system and they have difficulty retrieving substantial proportions of the relevant material existing on a topic"<sup>xlvi</sup> and notes that "frequent use of a system and a database leads to better use, and some training is better than no training"<sup>xlvii</sup>.

### ***Study Methodologies***

A number of different research strategies have been employed in studies of end-user search behaviour. The strategies include experiments, interviews and questionnaires,

observation, think aloud technique and transaction logs. Valuable overviews of the strengths and weaknesses of each of these procedures are provided by Tonta<sup>xlvi</sup>, Borgman, Hirsh & Hiller<sup>xlix</sup> and Large & Beheshti<sup>l</sup>.

Transaction log analysis is one of the most commonly used research techniques and the method chosen for the present study. Transaction Log Analysis involves the gathering of transaction logs from specified terminals and analysing the results, either quantitatively or qualitatively, to better understand end-user behaviour<sup>li</sup>. The exact content of transaction logs varies according to the software but will usually include the date, time and search, with some including information about the resultant search set<sup>lii</sup>.

A number of articles have been written surveying how transaction log analyses have been used and their strengths and weaknesses as a research technique<sup>liii</sup>.

As a research methodology, Transaction Log Analysis is very cost effective<sup>liv</sup>. Many search systems already contain a mechanism for gathering transaction logs and, if not, the software can often be purchased at a very reasonable price. Once the transaction logs have been gathered, no complicated analysis is required. Hunter notes that “...visually analysing transaction logs is an excellent and cost effective way for reference librarians to determine how the online catalog is being used”<sup>lv</sup>.

Another benefit of Transaction Log Analysis as a research methodology is that it is unobtrusive and provides an unbiased record of actual user behaviour in a real-life uncontrolled environment<sup>lvi</sup>. A number of authors have discussed the importance of Transaction Log Analyses ability to focus on actual user behaviour rather than the perceptions of either the user or the researcher with respect to user behaviour<sup>lvii</sup>.

However, the literature identifies six weaknesses associated with the use of Transaction Log Analysis.

A number of authors argue that one of Transaction Log Analyses most important weaknesses is an inability to record a user’s search intentions and reactions to the search results<sup>lviii</sup>. This lack of information forces the researcher to make assumptions about what was actually being searched for and whether the search was deemed to be



successful by the user. Wyly warns that such assumptions must be undertaken with extreme caution<sup>lix</sup>.

The unobtrusive nature of Transaction Log Analysis also means that, without the benefit of a user-name logging on procedure, it is not possible to match searches with users to investigate the relationship between specific user characteristics and searching behaviour<sup>lx</sup>.

Several authors noted that, although log data is straightforward, subsequent data analysis can be slow, tedious and difficult if an organisation wants to invest in more than informal inspections of the log<sup>lxi</sup>.

Given these limitations, most writers agree that Transaction Log Analysis should be used in conjunction with other research methods, such as experiments, Interviews and Questionnaires, Observation, and Think Aloud<sup>lxii</sup>. These research methods provide invaluable information to supplement that which has been gathered through Transaction Log Analysis. In their article “Rethinking Online Monitoring Methods for Information Retrieval Systems”, Borgman, Hirsh & Hiller suggest that multiple evaluation methods, both qualitative and quantitative, are required to achieve a full characterisation of behavioural processes as complex as online searching<sup>lxiii</sup>. Due to the limited scope and resources available for this study, it was not possible to include any such supplementary research methodologies.

Thomas Peters argues that developers and users can often encounter a difficult transition period during the development and introduction of a new data gathering method before the technology becomes generally accepted everyday tool but argues that Transaction Log Analysis seems to have reached this critical transition phase<sup>lxiv</sup>.

### ***Training Library Patrons***

The literature identifies a resistance to training within the legal profession, and other disciplines, with many patrons not being prepared to invest the time or money required to be able to do their own searches effectively.

It has been observed that end-users in a number of different contexts tend to learn only enough to do simple searches reasonably quickly and regard further instruction as unnecessary and more extensive expertise as a burden<sup>lxv</sup>.

Although diminishing, Nash argues that in the legal profession an additional reason for resistance is ‘the belief that terminal operation is a ‘typists job’, something to be undertaken by a secretary and therefore in some way demeaning for those with higher qualifications’<sup>lxvi</sup>.

Some authors also warn of the inherent limitations of training library patrons. Wallace provides a solemn warning about the limits of what we can expect to achieve through training in her article “How Do Patrons Search the Online Catalog When No One’s Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design”:

While it might be wonderful to think instructors could train searchers to spell properly, to remember synonyms, even to read a few screens of instructions, experienced educators will quickly remind us that such expectations frequently outstrip reality. And these are just the easy tasks. Far more daunting are the challenges of educating searchers in forming concepts, thinking abstractly, developing search strategies, modifying searches and understanding word associations. As will all other educational endeavours, it must be remembered that not everyone is going to be destined to become an effective searcher. Disregarding intellectual differences, many use such services as an OPAC infrequently, and even regular users simply are unwilling to take the time and effort to develop advanced searching skills<sup>lxvii</sup>.

Although many of these papers concern training within the University environment, the problems appear to be relevant to the experiences of training legal practitioners at the Auckland District Law Society Library.

## Methodology

Transaction logging software for the FolioVIEWS database software, was produced by Wordstream Corporation Limited and installed on two of the three Public PCs in the Auckland District Law Society. The third public PC was excluded because it is often used for training purposes and it was felt that the searches conducted on this PC may distort the results.

Once installed the transaction logs generated were gathered weekly, in both electronic and printed form, over a six week period when the proposed sample of over 1500 queries was reached. These electronic logs were then loaded into a Microsoft Access database for later analysis.

The logs were analysed through a combination of database queries (of the electronic transaction logs stored in the Access Database) and manual analysis (of the printed transaction logs).

The database queries and manual analysis recorded the following:

1. The databases used for each query
2. The Types of Searches being conducted:
  - Subject Searches
  - Legislation Searches
  - Searches for a Particular Decision
  - Cases Cited Searches
  - Words & Phrases Defined
  - Searches for Articles
  - Searches for Books
3. The Number of Queries in a Session (where a 'session' relates to a related set of searches)
4. The Use of Advanced Search Techniques
  - Alternatives (ie: OR connector)
  - Linking (ie: AND connector)
  - Exclusion (ie: NOT connector)
  - Truncation
  - Phrase Searching
  - Proximity Searching
  - Field Searching

## Results

### *The Databases*

An analysis of the transaction log was completed to establish how often each of the databases hosted on the public terminals was accessed throughout the six week study period. A summary of the frequency of use of the different databases is set out in Table One.

Of the 45 databases currently available to practitioners in the Auckland District Law Society Library, the LINX database is the most heavily used with 54 percent of the queries being performed within it. The fact that the LINX database functions as a catalogue for the Auckland District Law Society Library may have contributed to this result. The BRIEFCASE database was also well used with 16.7 percent of the queries being performed within it.

This finding has fairly major implications for training as the databases most predominantly used are abstract, rather than full-text, databases. This means that patrons can do not require quite the same level of skill as they would if the majority of the databases being used were full-text. Although these databases require some knowledge of search construction and Boolean, users do not need to be too familiar with proximity searching as the records are small enough not to necessitate the use of that search feature.

The usage of the other databases throughout the period of the study was comparatively insignificant. Current Law (UK) 2.6%, The Australian Digest 2.5%, Employment Headnotes of New Zealand 2.0% and the Employment Reports of New Zealand 1.9% were the databases most frequently used after LINX and BRIEFCASE. The remainder of the databases were used less than 25 times over the six week period with a number being referred to only once.

A visual analysis of the transaction logs revealed that a number of databases being referred to were being used inappropriately. For example, a number of single term searches were conducted in extensive full text databases such as the Dominion Law

Reports which would have retrieved an unmanageably large set of results with the search term appearing in wide range of potentially unrelated contexts. An example of such a search is for the term ‘naturalization’ in the Dominion Law Reports.

The inappropriate use of some databases, and the lack of use of others, could have important training implications. Although there is insufficient information to indicate exactly why certain databases are not being used or why they might be being used inappropriately, these results do tend to indicate a lack of knowledge regarding the existence and content of the databases being offered by the Library.

Infobase	Usage	Usage %
LINX database on Folio VIEWS	777	54.0%
BRIEFCASE	240	16.7%
Current Law 1986 -- date	38	2.6%
The Australian Digest	36	2.5%
EHNZ	29	2.0%
ERNZ	27	1.9%
Australian Legal Monthly Digest	25	1.7%
The Laws of Australia	25	1.7%
Dominion Law Reports 4th Series	23	1.6%
Legal Journals Index, 1986 -- date	21	1.5%
Daily Law Reports Index, 1988 -- date	18	1.3%
Federal Cases	15	1.0%
Employment Contracts	13	0.9%
Department for Courts Sentencing Digest	12	0.8%
crnat1-t.nfo	11	0.8%
The Abridgment: Canadian Case Digests	11	0.8%
Essential Anderson's	10	0.7%
Insolvency	8	0.6%
Statutes	8	0.6%
McGechan on Procedure	7	0.5%
Brooker's Summary Proceedings	7	0.5%
CRNZ	7	0.5%
Company Law Historical Legislation	6	0.4%
Australian Case Citator	6	0.4%
Salmon - Resource Management Act 1991	6	0.4%
District Courts Procedure	5	0.3%
PRNZ	5	0.3%
Status Compendium	4	0.3%
NZ Environmental Digest & Law Reports of NZ	4	0.3%
Maori Land Judgments	4	0.3%
Federal Cases Citator	4	0.3%
Contents Infobase for Auckland District Law Society Library	4	0.3%
Adams on Criminal Law	4	0.3%
Accident Compensation	3	0.2%
Statutory Penalties Library	3	0.2%
Anderson's Plus	2	0.1%
STATUTES OF CANADA	2	0.1%
BADGER grey paper index, 1994 -- date	2	0.1%
Commonwealth Acts, Regulations & Annotations (August 1997)	1	0.1%
Company Law Legislation	1	0.1%
crnat2-t.nfo	1	0.1%
crtoc-f.nfo	1	0.1%
Regulations	1	0.1%
Federal Cases Archive	1	0.1%
Federal Legislation Infobases	1	0.1%
crnat3-t.nfo	1	0.1%

**TOTAL SEARCHES**

**1440**

*Figure One: A Summary of Database Usage*

## ***Types of Searches***

A manual analysis of the search queries was undertaken to establish what types of searches were being conducted throughout the databases. The eight categories of possible search types were as follows:

### **1. Subject Search**

These were searches where the search terms indicated the patron was looking for case law or commentary on a particular legal topic.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
liquidation	Essential Andersons
constructive dismissal	LINX
accident loss theft	BRIEFCASE
disadvantage	Employment Contracts
disadvantage employment	LINX

### **2. Discussion of Legislation**

These were searches where search terms indicated the patron was looking for case law or commentary on a particular legislative provision or an entire act.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
S33(2) Immigration Act	LINX
criminal justice act s21	LINX
consumer guarantees act and s27	LINX
contractual remedies act and s7(2) or s7(3)	Employment Contracts
s199 summary proceedings negligence	LINX

### **3. Cases Cited**

These were searches where search terms indicated that the patron was looking for case law or commentary discussing a particular decision, indicated by the use of proper nouns or citations within the search.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
queen and kerr	LINX
argyll stores	LINX
williams v attorney general 1990 1 nzlr 646	BRIEFCASE
[Field Cases Cited:bradlaugh]	BRIEFCASE
[Field Case Citation:hill v cantec]	ERNZ

#### 4. Words & Phrases Defined

These were searches where search terms indicated that the patron was looking for case law or commentary which discusses the precise legal definition of a particular word or phrase (often indicated by the word(s) being entered into this part of the template and/or the words ‘meaning’ or ‘interpretation’ being used in the search.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
de facto and definition	LINX
[Field Definition Phrase:compensation]	Accident Compensation
[Field ‘Words cons/def’:void]	LINX
“annual leave” meaning	ERNZ
[Field Words:age]	BRIEFCASE

#### 5. Text of Legislation

These were searches where a search was conducted in an appropriate statutory database for a particular Act or provision.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
[Level Heading Level 1/land and water]	Commonwealth Acts
high court rules	Status Compendium
[group land transfer 1952]	Status Compendium
[field act name: distress]	Status Compendium
official information act 1982	Status Compendium



## 6. Text or Summary relating to a particular decision

These searches were indicated either by a proper noun being entered into the Name field or by the fact that a number of different details such as Court, Judge and Date were filled in which appeared to be relevant to a particular case.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
[Field Name:williams v attorney general]	LINX
[Field Name: r v arcic]	LINX
[Field Case Name:irvines]	EHNZ
[Field Name:mcinnes][field Court:accident]	BRIEFCASE
[Field Court:hc][Field Judg Date:2feb1996]	LINX

## 7. Article, Seminar or Book

These were searches where search terms indicated that the patron was interested in finding commentary relating to a particular subject or by a particular author - indicated by the use of field limiters distinctive to textbooks, seminars or articles.

<i>SEARCH TERMS</i>	<i>DATABASE</i>
tort and dugdale [Field journal:]	LINX
life interest [Field title:]	LINX
will [Field isbn:]	LINX
protection of personal [Field classification:]	LINX
Dixon's	LINX

## 8. Other

This category includes any searches which did not come under any of the above categories.

There were some instances where more than one of the indicators listed above appeared in a single search. A series of rules were developed which established that the most unique indicator would be considered to be the primary for the purposes of categorisation. For example, if a search contained an act name or a specific legislative provision it was categorised under Legislation Discussed.

It was difficult to distinguish between cases cited searches and searches for the actual text or summary relating to a particular decision. Where a case name was entered generally, as opposed to being entered into the NAME field, it was assumed that the patron was looking for case citations. This categorisation necessarily ignores the fact that such users may have been looking for the actual text but be unaware of the mechanism for narrowing it down.

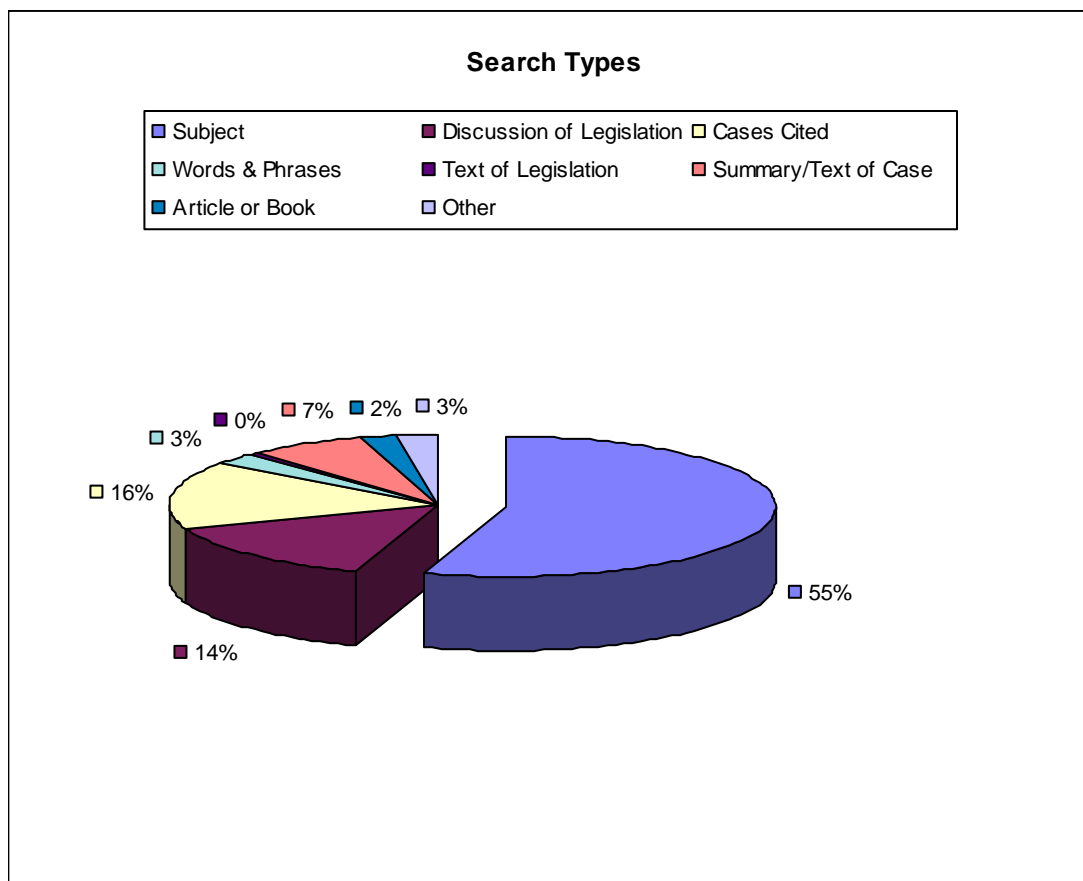
A pie chart which illustrates the relative frequencies of these different types of search of the study period is set out in Figure Two.

Clearly, the most popular type of search conducted is a subject search for material relating either to a particular topic area or a particular fact situation with fifty-five percent of queries looking for subject related materials. Studies of searches conducted on the MEDLINE database have also found subject searches to be the most popular search type with percentages ranging from 70-95%<sup>lxviii</sup>.

This has important implications for training because searching for cases with similar fact situations, or analogous legal authority, is the most difficult material to find and requires a number of sophisticated search skills, such as the use of alternatives, truncation and proximity, to be effective.

It also suggests that teaching students how to conduct field searching, using the FolioVIEWS template search option, is less important than teaching students search construction techniques for global searching, using the FolioVIEWS query search option.

The next most common search types were searches for materials discussing legislation (14.4%), citing a particular decision (15.6%) and looking for summary/text of a particular decision (6.9%). This backs up the assumptions used in putting the training programmes together and re-emphasises the need to ensure that trainees are confident in knowing how to conduct these specific searches by the end of the training session.



*Figure 2: Pie Chart of Types of Search Conducted*

Searches conducted for Words and Phrases (2.8%) and Articles or Books (2.2%) are significant enough to warrant attention within the training courses, although much less common than the other search types. The Words and Phrases training appears particularly important as the analysis revealed several searches where individuals did not use the template and tried the ineffective method of “meaning and TERM” or “interpret and TERM” to find meaning. An example of this type of search is the search ‘ “living together” and “meaning of” ‘ which was executed in the LINX database.

A surprising result is how few searches were conducted in the Statutes and Regulations databases to find the actual text of a specific Act or provision (0.05%). There is insufficient information to indicate why this might be the case. It may be that many of the patrons who use the library still prefer to use the manual statutes for obtaining the full text of an act or specific provision rather than obtaining the material electronically. An alternative explanation may be that there is a lack of knowledge

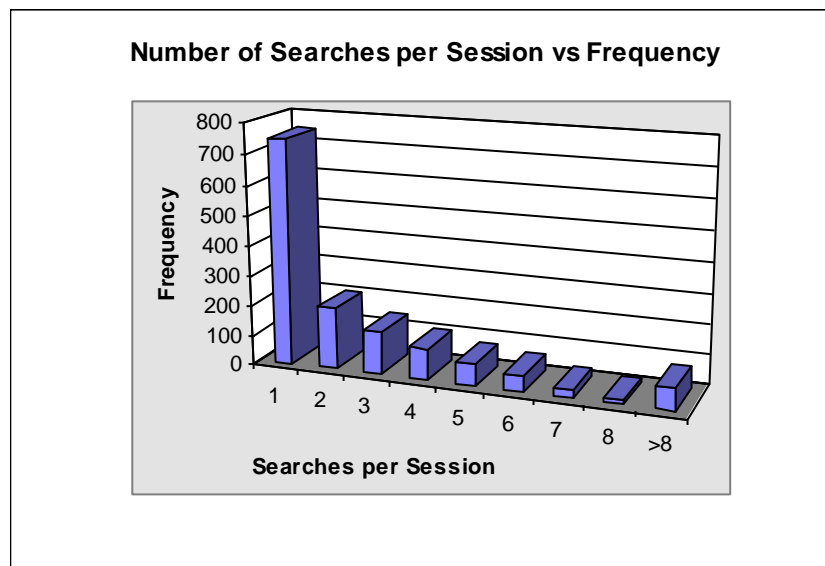
about the existence of the electronic version within the library in which case there is an indication that training should focus on drawing this to practitioners attention.

### ***Number of Queries in a Session***

A print-out of the transaction log was visually analysed to establish number of queries which made up any given session. A 'session' was defined as a set of related queries within a particular database. To identify an individual session the queries had to have been conducted in the same database must have been for identical or substantially similar information.

The aim was to see whether patrons were searching inefficiently and using a large number of searches where two or three would have been sufficient. Sessions comprising more than three search queries were seen as being less efficient because they usually indicated a series of searches with repeated terms which included substantially similar results taking longer to evaluate than the results of a few well constructed searches.

A summary of the number of queries per session is set out in Figure 3.



*Figure 3 : Number of Queries per Search Session*

The largest majority of sessions comprised only one query (747/1440 or 52 percent). This would be heartening except for the fact that there is insufficient information to establish definitively whether this was because patrons were actually satisfied with their searches or simply stopped searching without finding what they were looking for. The broadness of many of the queries would tend to indicate the latter.

A significant number of sessions comprised between two (204/1440), three (144/1440) or four (104/1440) queries. The largest number of total queries making up a session was 14 which took the searcher over one and a half hours to complete.

As in other types of research, it is likely that false starts occur before Computer-Aided Legal Research is on course<sup>lxix</sup>, so these numbers, in and of themselves, do not indicate a problem.

A closer investigation revealed that a number of these multiple query sessions appeared to be congruent with the searching models identified by Bourne, Anderson & Robinson<sup>lxx</sup>.

Two of the most common searching models identified through a visual examination of the transaction logs appear to be **Successive Fractions** and **Most Specific Facet First**.

**Successive Fractions** includes instances where searchers began with a broad query, and a large set of results, which they reduce by adding further terms. For example, ‘undertakings as to damages’ becomes ‘undertakings as to damages and transfer’. This popular approach to legal research was noted by Fred M Greguras in “Legal Research” from *Online Search Strategies*<sup>lxxi</sup> who observed that some legal researchers prefer a broad initial search inquiry to get a “feel” for the research materials and the “terms of art” before narrowing their search request. A study by Wallace of the public access terminals at the University of Colorado Libraries, also found this strategy to be very popular among users with three-fourths of all word searches beginning with one or two words, and about one-third of those searches being further narrowed by adding one or more additional words<sup>lxxii</sup>. It is interesting to note that many Transaction Log

Analysis studies reveal that users tend to work with poor, inefficient, high-recall searches, rather than attempt to refine their searches to make the results more precise<sup>lxxiii</sup>.

**Specific Facet First** includes instances where searchers began with a narrow multi-concept search and then gradually broaden it by successively deleting individual search terms. For example ‘beneficiary will life interest’ becomes ‘life interest’. These searches did not appear to be as common as the successive fractions approach but were prevalent throughout the transaction logs.

A number of other searchers appeared to use Bourne, Anderson & Robinson’s **Citation Pearl Growing** model, where they would use an initial search to find some relevant material and then use the results get more terms which are used in successive searches. This approach to online search was also highlighted by Bates who observed that searchers do not tend build one great set and then evaluate it, but prefer to “berry-pick,” selecting a few interesting records from each search segment, altering the search strategy based on interim results<sup>lxxiv</sup>.

The visual examination also highlighted a number of instances where the patrons repeated searches using identical search terms or simply changing their order, presumably under the false belief that this might alter their original results. For example one search began ‘family court jurisdiction’ and then became ‘jurisdiction court family’ and, finally, ‘court jurisdiction family’. A similar phenomenon was observed in a study by Thomas Peters<sup>lxxv</sup> where observed that repetitions of search terms occurred quite often, especially after zero-hit data-entry searches and they were dubbed ‘incredulous repetitions’ because ‘evidently the user did not believe the results of the search’.

These incredulous search repetitions, broad searches with large result sets, narrow searches with too few results and instances of complete abandonment could be viewed as an indication that practitioners are having difficulty in reformulating effective search strategies when initial searches do not provide the information sought<sup>lxxvi</sup>. Assuming that this hypothesis is correct, this has important training implications in terms of providing practitioners with the search conceptualisation skills and construction tools

required to formulate effective initial search strategies, and then modify these according to the results retrieved.

Author Rita Reusch, in a discussion of teaching legal research to law students, notes the problems often associated with searching long abstract and full text databases. She notes that often searches will be either too broad, which gives too many results to be useful, or too narrow, which means that the searcher is likely to be missing relevant information within the database. However, her article simply presents the problem without suggesting any solutions<sup>lxxvii</sup>.

It was also concerning to note that searches executed by practitioners on a specific topic were not necessarily consistent between databases, as patrons continued to reformulate searches across databases. For example, one searcher executed the query 'email or "electronic mail"' in the LINX database and subsequently entered the query 'electronic and mail' in BRIEFCASE. This has implications for search consistency and efficiency, as searchers obtain excellent results in one database but miss equally relevant material from databases in which they failed to re-execute the final reformulated search. This highlights the need to emphasise the importance of developing a single search strategy during the initial stages of research, which can be recorded and used in all databases, rather than this less rigorous ad-hoc approach.

Finally, it was interesting to see that only a few of the multiple searches were the result of typographical or spelling errors. One of the few examples was the search '[field catchwords:reciporcal judgments]' executed in the BRIEFCASE database. This finding could be a result of the fact that many of the practitioners are regular users of the databases. Fenichel found that both moderately experienced and very experienced searchers made significantly fewer non typographical errors per search than did novices, although the overall number of errors remained small at 2.8 percent for novices<sup>lxxviii</sup>. However, this result is in contrast to a number of the OPAC studies highlighted in the literature review which found spelling errors to be a prominent cause of search failure.

## ***Use of Advanced Search Techniques***

A combination of automated and manual analysis of the transaction log was conducted to establish how commonly advanced search techniques were being used by patrons.

The advanced search techniques specifically studied were: (1) the use of the AND, OR and NOT connectors, (2) truncation, (3) phrase searching, (4) proximity searching and (5) field searching.

A summary of the advanced search features used in the transaction logging is set out in Figure 4.

*Figure Four: Use of Advanced Features*

Advanced Feature	Special Character	Usage
Phrase Search	"	162
Truncation	*	141
Proximity (I)	/	45
Proximity (II)	@	0
Field Search	[	611
Field Search	]	672
Boolean AND	AND	474
Boolean NOT	NOT	1
Boolean OR	OR	62

### **Use of Connectors**

Less than a third of the searches recorded utilised any of the three possible connectors within FolioVIEWS. In many instances the searches simply comprised a string of unrelated words which appeared to rely upon the implicit AND connector in the FolioVIEWS software.

Of the searches which did contain connectors, most utilised the AND connector (33% or 474/1440). Far fewer searchers used the OR connector to separate synonyms or alternatives (4% or 62/1440). Instead of constructing searches containing alternatives, many searchers conducted multiple queries which each contained different synonyms or alternatives. For Example, one searcher executed the search ‘maintenance shopping’ and then the search ‘maintenance building’. Another searcher executed the search ‘Internet and copyright’ and then the search ‘hypertext and copyright’. A



similar pattern was evident in the search strategy ‘District Court and hearings’ followed by ‘district court and trial’. The analysis of the transaction log found only one search containing the NOT connector to exclude records containing a particular term.

These findings are consistent with a number of other studies which have reported low use of features such as Boolean<sup>lxxx</sup>. In his study of students using an online public access catalog, Thomas Peters found that only 2.8% of the students used features such as Boolean<sup>lxxx</sup>. Nelson, studying the search behaviour of medical students found that a mere 9% of the searches utilised Boolean<sup>lxxxi</sup>. A study of law students use of the Canadian QUICKLAW database by Yuan also found that use of the Boolean connector ‘OR’ was low<sup>lxxxii</sup>.

The use of Boolean connectors has been described as a key tool for conducting effective searches<sup>lxxxiii</sup>. A number of commentators argue that use of the OR connector is particularly important in the legal context where abstract and full-text databases are prevalent. In his article “End-User Searching Behavior in Information Retrieval: A Longitudinal Study”, Yuan states that existing research seems to indicate that using the Boolean OR command is helpful<sup>lxxxiv</sup>. He cites Tenopir and Ro state that searchers of full-text databases should use all word enhancement features available to them, including synonym development<sup>lxxxv</sup>. In another study of searching in the legal environment<sup>lxxxvi</sup>, Jon Bing identifies synonyms as the main cause for retrieval failure because a single idea may be represented by a number of words or phrases. Bing makes reference to studies of the NRCCL which study the characteristics of full text and natural language databases that make the use of synonyms and the OR connector so vital. The NRCCL studies note that approximately 50-60 percent of retrieval failure is due to the specificity of natural language, especially case law language<sup>lxxxvii</sup>.

Specificity refers to the fact that concepts may be described in a particular way depending upon the specific context, for example, a child may be referred to by his or her proper name throughout a decision. These studies also note that specificity is counteracted by the natural redundancy of language whereby authors tend to use more than one term to describe a subject. For example a boy under discussion will not only be called by his proper name, but also ‘boy’, ‘child’, ‘infant’ or other similar terms. The studies attribute around 15-25 percent of retrieval failure to the implicit of

natural language<sup>lxxxviii</sup>. Implicitly encompasses situations where the meaning is “between the lines” or otherwise implied in the text. It is argued that this “represents an absolute limit to the recall performance of text retrieval based on natural language”<sup>lxxxix</sup>.

The lack of use of an OR connector in the present study is alarming, particularly because the databases do not use controlled language and so many of the searches were subject searches which are difficult without the use of alternatives. The library needs to emphasise the Boolean capabilities of FolioVIEWS and recommend search strategies that encourage the use of synonyms in both the training programmes and documentation.

### Truncation

Only (141/1440 or 9.79%) of the searches logged during this study used the truncation symbol ‘\*’ to search for different word stem endings. There were a few instances where patrons appeared cognisant of the need to look for different word variations and conducted separate searches to look for different word variations. For example one searcher conducted separate searches for the terms ‘zone’ and ‘zones’. Another conducted the searches ‘signature trustees’ and ‘signature trustee’ to look for different variations of the term ‘trustee’. A search session which could have benefited greatly from the use of truncation comprised the following series of queries: ‘pharmacist’, ‘pharmacy and dispensary’, ‘pharmacy’, ‘pharmaceutical’, and ‘pharmacies’.

Again, these results appear to be consistent with the results observed in other studies. In her study of the search behaviour of medical students Nelson records that only three percent of the queries logged used truncation<sup>xc</sup>. A paper by Kern-Simierenko titled “OPAC User Logs: Implications for Bibliographic Instruction” (as cited by Thomas Peters) does not provide an actual figure, but notes that “most users do not use truncation as a way of increasing recall”<sup>xcii</sup>.

The lack of evidence of the use of truncation is concerning as it can be very easy to miss information when a search contains only one variation of a particular word. For example a search for ‘Dixons Road Traffic Law’ will miss the text titled *Dixon’s Road*

*Traffic Law*. The search ‘*Breach* Periodic Detention’ misses any records which discuss *breaches* of periodic detention or the consequence of *breaching* periodic detention.

It is important that training activities and supporting documentation highlight the truncation tool and emphasise its importance in constructing effective searches.

## Phrase Searching

FolioVIEWS allows users to specify that words appear together by surrounding words with quotation marks, for example “State Owned Enterprises Act”.

An automated search of the database of search queries was conducted to highlight how many searches included the use of at least one set of speech marks. Eleven and a half percent (or 162/1440) of the searches were found to have used this capability.

Interestingly, a visual examination of the search queries found that there were a number of instances where speech marks were used to surround a single word, indicating a lack of understanding about the use of quotation marks within FolioVIEWS. Examples of this incorrect use of the phrase facility are the queries “Holiday”, “Obligations” and “Courtville”.

Although failure to utilise phrase searching, or utilising it incorrectly, is unlikely to be fatal to search efforts, the documentation and training courses should ensure that trainees leave with a clear understanding about the availability and operation of this facility.

## Proximity Searching

FolioVIEWS utilises a cumbersome formula for specifying that search terms should be proximate to one another. In order to specify that you would like search terms to be within five words of one another you can enter “Term1 Term2”/5 (to specify ordered proximity) OR “Term1 Term2”@5 (for unordered proximity). It is not possible to specify proximity for more than two terms within a single set of quotation marks nor is it possible to truncate or specify alternatives within a set of quotation marks, which makes true workable proximity searching within full text databases almost impossible.

It is not surprising therefore that very few of the searches (3.13% or 45/1440) used ordered proximity (/) and there were no searches which used unordered proximity (@).

Due to the short record size of the two most commonly used databases, LINX and BRIEFCASE, this is unlikely to be a problem for library patrons. However, with the growing number of full text legal databases being introduced, proximity searching is likely to become more necessary and increasingly important in the training and documentation provided by the Auckland District Law Society Library.

## Field Searching

FolioVIEWS provides two alternative input screens for searches. The QUERY window simply provides a generic input screen for search terms and will search the entire record for any occurrences of these terms. It is possible to conduct field searching within the Query search screen by using [ ] at the bottom. The TEMPLATE window provides an overview of important record fields and search terms may be entered into any individual field to limit the search to occurrences of terms only within that part of the record. Searches which have utilised Field Searching, through either the QUERY or TEMPLATE window will include square brackets and Field Label in the logged search.

A manual analysis was conducted to identify the number of searches which utilised this advanced search feature. A total of 260/1440 or 18% of searches actually used a search field.

The visual examination of the records indicated that there were instances where field searches would have been appropriate, but were not being utilised. These were particularly evident with searches for the judicial definition of a term where searchers used inappropriate search strategies such as 'Term and mean\*' or "Term and definition", rather than either the Template or the Square Brackets within the QUERY search screen.

These results are consistent with the earlier finding that the majority of searches conducted are subject searches and that a maximum of 28% of the searches recorded could potentially have benefited from the utilisation of field search techniques.

Overall, it appears that the majority of those searches which could benefit from restricting the search to a specific field are in fact utilising field searching and that this is a less important to include in the training than many of the advanced search features outlined above.

## Discussion

The purpose of this study was not to investigate the level of ‘success’ or ‘failure’ of the searches included in the transaction log. However, it seems appropriate to consider what might constitute search ‘success’ in the legal context, for the benefit of further discussion and future studies

Any previous attempts to measure search success or failure appear to have been fraught with a number of dilemmas. In a comprehensive and well respected review of retrieval studies, Tonta concludes that there is no currently agreed upon measure of ‘success’ with respect to document retrieval systems<sup>xcii</sup>. The writings suggest potential measures of success could be the number of hits, user satisfaction, recall and precision.

### ***Number of Hits***

Many studies have used ‘Zero-Hits’ as a measure of search failure, so that any query which results in a results set greater than zero was automatically considered to be successful<sup>xciii</sup>.

A number of authors have criticised this measure as being flawed because a zero results set may be a perfectly valid outcome of a particular query and does not necessarily mean that the patron had a problem using the system, that the search was a failure or that they went away frustrated<sup>xciv</sup>. Tonta also criticises this definition of search failure as being incomplete as it does not take account of partial failures and because there is no reason to believe that all ‘non-zero hits’ searches were successful ones<sup>xcv</sup>.

The Zero Hits method would be a particularly inappropriate measure of success within the legal context because the search for analogous legal precedent is an example of a situation where a zero-hit search might actually constitute a successful search<sup>xcvi</sup>.

## ***User Satisfaction***

A number of other studies rely on user satisfaction as the primary measurement of search success or failure.

However, Tonta criticises this measure noting that there can be difficulties in defining user satisfaction<sup>xcvii</sup>. He also notes that user judgements may be inconsistent and that it can be difficult to classify ‘maybe’ answers.

Another common criticism of this method is that user satisfaction may not reflect the true success rate as many users might not consider a search to be a failure even if it has missed some relevant documents<sup>xcviii</sup>. This may be due to searchers not realising that the search has not retrieved all of the relevant material. This phenomena was observed in a number of studies in the legal environment. Blair & Maron found that lawyer-users did not realise that they were not getting all of the documents of probable relevance to a certain issue<sup>xcix</sup>. Morse & Pao observed that unsuspecting searchers looking for topics for his or her own use could be ‘lulled into believing that the retrieved set contains most, if not all, of the useful items’<sup>c</sup>.

Despite these criticisms, a number of commentators have argued strongly in favour of adopting user satisfaction as the primary measure of success. One such author was Patricia Wallace observed that end-user searching is here to stay and argued that user satisfaction, rather than what the librarian thinks the user wants or needs, has become the key element for defining search success<sup>ci</sup>. This sentiment is echoed by Large & Beheshti who argue that “It is now widely agreed that the relevance or otherwise of a retrieved set must be judged subjectively by the individual searcher rather than objectively in some way by the researcher”<sup>cii</sup>.

User satisfaction may be a valid measure of success in the context of undergraduates writing a term paper, but it is inappropriate for health or legal professionals who often need to know everything about a certain case because the outcome of missing relevant information may have serious consequences<sup>ciii</sup>. In the legal context a lawyer could be sued in negligence and in the medical context failure to identify relevant information could be fatal.

### ***Precision and Recall***

Precision measures the proportion of relevant to non-relevant documents retrieved by a particular search. The retrieval of non-relevant documents in a search will constitute precision failure of a search.

Recall measures the proportion of items retrieved from the total number of relevant documents in database<sup>civ</sup>. If a search misses records which may be relevant that will constitute recall failure.

Both of these measures will usually be expressed as a percentage and can therefore indicate degrees of search success or failure<sup>cv</sup>. They can be difficult to measure accurately and, probably as a result, have been studied much less frequently<sup>cv</sup>.

Recall and precision are closely related. Generally, it has been found that users prefer high precision to high recall and want ‘some good references without having to examine too many bad ones’<sup>cvii</sup>. In his article “Performance of Legal Text Retrieval Systems”, Jon Bing makes reference to ‘a well-known and well-documented rule of thumb in text retrieval’ which states that increased precision is gained only at the expense of a loss of recall and vice versa<sup>cviii</sup>. He goes on to observe that a relatively high precision will give lawyers high user satisfaction as long as alternative methods do not disclose that the recall is low<sup>cix</sup>.

### ***Measuring Search Success in the Legal Context***

It seems obvious that, in the context of the majority of legal research (which is undertaken to find all analogous legal authority), recall would be the most appropriate measure of ‘success’.

If recall is used as the primary measure of ‘success’ then a high proportion of the searches included in the present study could be considered to be unsuccessful because they were either too narrow, failed to include synonyms, lacked truncation or were conducted in the wrong database and consequently would have failed to highlight all of the records in the database which may have been relevant to the problem. Such results



are alarming considering how important it is for lawyers to find relevant materials when preparing for a case.

In light of similar findings, some authors have recommended improving the bibliographic records which make up databases<sup>cx</sup>. It is possible that more extensive use of subject headings in the abstract databases would make it easier for practitioners to find cases discussing a particular legal *concept*, such as CONTRIBUTORY NEGLIGENCE. However, it would be very difficult to devise subject headings to overcome the difficulties involved in finding cases with a particular factual *context* given the infinite ways that individual fact situations could be described.

Other writers suggest that the focus should be on designing better user interfaces<sup>cx</sup>. In the legal environment the effectiveness of practitioner searching could be significantly improved through interfaces which provided lists of synonyms for particular terms and encouraged searchers to select appropriate alternatives from this list to be included in their search. Another feature which could improve search recall would be prompting for truncation on terms which are known to have a variety of different word endings. Similarly, it is suggested that search engines which automatically searched for plurals could improve search recall.

Until such improvements can be established or the general search skill level improved, it is suggested that the library become involved in a general education programme to inform end-user lawyers that they may be, in fact most probably are, missing important information and that mediated searches could provide more complete results. Some assistance should be provided to help users recognise those situations in which end-user searches may be inappropriate<sup>cxii</sup>.

## Recommendations

The results of this study indicate that there is a need for further training of legal practitioners using the Auckland District Law Society to increase the effectiveness of searches being conducted.

The following recommendations are made with respect to the actual training programmes, and the associated documentation, offered by the Auckland District Law Society.

The first recommendation is to ensure that all training programmes include conceptual information regarding databases, their structure and how they are organised. The importance of this was highlighted by a number of studies covered by the literature review undertaken as part of this study.

The second recommendation is to offer additional training sessions which are dedicated to the availability and content of the databases offered at the Auckland District Law Society Library. The literature emphasised that a lack of knowledge of the content of a database can have a significant effect on search effectiveness. The results of the present study highlighted a number of instances where searches were being conducted in inappropriate databases indicating a lack of understanding of the database content. In addition, it was suspected that some databases, such as the Status Database of New Zealand Statutes, may not be being used because practitioners are not aware that it is available. Regular free lunchtime demonstrations for practitioners are suggested as a way of overcoming the lack of use of some databases and the inappropriate use of others.

The third recommendation is that the courses offered by the Auckland District Law Society Library continue to teach advanced search techniques (particularly search construction, use of synonyms and truncation) as these are important tools for increasing recall in the context of subject searches, the type of search which was most frequently recorded in the study. These skills also have the potential to increase search efficiency and reduce the costs of searching by decreasing practitioner time in front of the terminals<sup>cxiii</sup>.

The fourth recommendation is that courses offered by the Auckland District Law Society Library continue to include instruction relating to Field and Phrase searching. The results of the study indicate that these remain important tools for at least a third of the searches being conducted, but that they are not always being used correctly or appropriately.

## Conclusion

There is no doubt that document retrieval is an art rather than a science. This has been confirmed in a study by Saracevic & Kanto<sup>cxiv</sup> who studied professional searchers and found less than a 20% overlap in the search terms used and results obtained by these full-time searchers.

However, it is playing an increasingly important role in legal research with more information becoming available electronically. This study has shown that, although the most common type of search is for analogous legal authority, a search strategy requiring the most sophisticated of search tools, many searchers in the Auckland District Law Society Library are relying on very basic search strategies which are likely to result in low recall. Lawyers appear to be approaching searching with raised expectations, assuming that the computer will be capable of using an unsophisticated search query to conduct an analysis of the problem and return relevant materials. Problem analysis, however, is still the domain of the legal researcher not the computer<sup>cxv</sup>.

The challenge for the library is to continue to offer training programmes to increase practitioner search skills, to work with database and interface designers to improve systems and ensure that practitioners are aware of the limits of end-user searching.

Word Count: 11,258 (excludes Bibliography and Endnotes)

## Bibliography

- Ala, Judy and Kathy Cerebona. 1992. Boolean Searches: A Life Skill. *School Library Journal* (Nov): 42.
- Alzofon, Sammy R and Noelle Van Pulis. 1984. Patterns of Searching and Success Rates in an Online Public Access Catalog. *College & Research Libraries* (Mar): 110-115.
- Armstrong, C.J. 1990. New Approaches in the Training and Education of Online Users. *Online Review* 15 (3/4): 147-171.
- Baker, Betsy and Beth Sandore. 1987. The Online Catalog and Instruction: Maintaining the Balance on the Log. In *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey, 192-203. Colorado: Libraries Unlimited, Inc.
- Baker, Betsy, Mary M Huston and Maureen Pastine. 1991. Making Connections: Teaching Information Retrieval. *Library Trends* 39(3): 210-222.
- Ballard, Terry. 1996. Library Systems: Transaction Log Fever. *Information Today* 13(6): 56.
- Berger, Michael and Mary Jean Moore. 1996. The User Meets the MELVYL System. *DLA Bulletin* 16 (1): 13-21.
- Bing, Jon. 1987. Performance of Legal Text Retrieval Systems: The Curse of Boole. *Law Library Journal* 79: 187-202.
- Borgman, Christine L. 1986. Why are Online Catalogs Hard to Use? Lessons Learned from Information-Retrieval Studies. *Journal of the American Society for Information Science* 37 (6): 387-400.
- Borgman, Christine L, Sandra G Hirsh and John Hiller. 1996. Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to

Search Process. *Journal of the American Society for Information Science* 47 (7): 568-583.

Cahan, Mitchell Aaron. 1989. Grateful MED: A Tool for Studying Search Behaviour. *Medical Reference Services Quarterly* 8 (4) : 61-79

Ensor, Pat. 1992. User Characteristics of Keyword Searching in an OPAC. *College and Research Libraries* (Jan): 72-80.

Flaherty, Patricia. 1993. Transaction Logging Systems: A Descriptive Summary. *Library Hi-Tech* 11 (2): 67-78

Frost, Susan. 1988. Teaching Students to use Full Text Online Databases: Practical Administration. 19 (2): 56-58.

Greguras, Fred M. 1982. Legal Research. In *Online Search Strategies*, ed. Ryan E. Hoover, 213-239. New York: Knowledge Industry Publications, Inc.

Hunter, Rhonda N. 1991. Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis. *RQ* 30 (Spring): 395-402.

Huston, Mary M. 1989. Search Theory and Instruction for End Users of Online Bibliographic Information Retrieval Systems: A Literature Review. *Research Strategies* (Winter): 14-32.

Jacobs, Edward. 1988. Teaching Students to use Full Text Online Databases: Course Design and Integration. *The Law Librarian* 19 (2): 53-56.

Jones, S, M. Gatford, T. Do and S. Walker. 1997. Transaction Logging *Journal of Documentation* 53 (1): 35-50

Kaske, Neal. 1993. "Research Methodologies and Transaction Log Analysis," *Library Hi-Tech* 11 (2): 79-86

Kelly, Mary. 1990. Lawyers need Training to Use Legal Databases. *Canterbury Tales* (Feb): 3-4.

King, Natalie Schoch. 1991. Search Characteristics and the Effects of Experience on End Users of PaperChase. *College & Research Libraries* (Jul): 360-373.

Kurth, Martin. 1993. "The Limits and Limitations of Transaction Log Analysis," *Library Hi-Tech* 11 (2): 98-104.

Large, Andrew and Jamshid Beheshti. 1997. OPACs: A Research Review. *Library & Information Science Research* 19: 111-133.

Lippincott, Joan K. 1987. End-User Instruction: Emphasis on Concepts. In *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey, 183-191. Colorado: Libraries Unlimited, Inc.

Mancall, Jacqueline C. 1988. Examining the Successful Retrieval of Information by Students Using Online Databases. *School Media Quarterly* (Summer): 256-259.

Morse, Anita and Miranda Lee Pao. 1994. A Decision Tree for End User Searching in a Large Interactive Legal Database. In *Proceedings of the 15<sup>th</sup> National Online Meeting 1994* ed Martha E. Williams, 335-343. New York: Learned Information Inc.

Nash, Elizabeth. 1988. Teaching Students to use Full Text Online Databases: Changing the Climate. *The Law Librarian* 19 (2): 49-52.

Nelson, Janet L. 1992. An Analysis of Transaction Logs to Evaluate the Educational Needs of End Users. *Medical Reference Services Quarterly* 11 (4):11-21

Peters, Thomas. 1989. When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog. *The Journal of Academic Librarianship* 15 (5): 267-273.

Peters, Thomas A. 1993. The History and Development of Transaction Log Analysis. *Library Hi-Tech* 11 (2): 41-66

Peters, Thomas. 1996. Using Transaction Log Analysis for Library Management Information. *Library Administration & Management* 10 (1): 20-25.

Pritchard-Schoch, Teresa. 1993. Teaching Online Legal Research. *Online* (Nov): 106-111.

Pritchard-Schoch, Teresa. 1994. Teaching Online Legal Research: LEXIS. *Online* (Mar): 106-108.

Reusch, Rita. 1984. The Search for Analogous Legal Authority: How to find It When You Don't Know What You're Looking For? *Legal Reference Services Quarterly* 4 (3): 33-38.

Reichel, Mary and Mary Ann Ramey Koelski. 1987. *Conceptual Frameworks for Bibliographic Education: Theory into Practice* (Colorado: Libraries Unlimited Inc, 1987).

Sanderson, Rosalie M. 1990. The Continuing Saga of Professional End-Users: Law Students Search Dialog at the University of Florida. *Online* (Nov): 64-69.

Sandore, Beth. 1993. Applying the Results of Transaction Log Analysis. *Library Hi-Tech* 11 (2): 87-97.

Saracevic, Tefko and Paul Kantor. 1991. Online Searching: Still an Imprecise Art. *Library Journal* (1 Oct 1991): 47-51.

Saule, Mara R. 1992. User Instruction Issues for Databases in the Humanities. *Library Trends* 40 (4): 596-613.

Silverstein, Steven H. 1990. An Index Model for Query Formulation. *Legal Reference Services Quarterly* 10 (3): 115-124.

Thomas, David A. 1988. Training American Law Students in Computer-Assisted Legal Research. *The Law Librarian* 19 (2): 59-62.

Tonta, Yasar. 1992. Analysis of Search Failures in Document Retrieval Systems: A Review. *Public-Access Computer Systems Review* 3 (1): 2-40.

Vollaro, Alice J and Donald T Hawkins. 1986. End-User Searching in a Large Library Network: A Case Study of Patent Attorneys. *Online* (July): 67-72.

Wallace, Patricia M. 1993. How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design. *RQ* 33 (2): 239-252.



- Wyly, Brendan J. 1996. From Access Points to Materials: A Transaction Log Analysis of Access Point Value for Online Catalog Users. *Legal Resources and Technical Services* 40 (3): 211-236.
- Yuan, Weijing. 1997. End-User Searching Behavior in Information Retrieval: A Longitudinal Study. *Journal of the American Society for Information Science*. 48 (3): 218-234

## **Appendix One**

### **A Listing of Databases Available at the Auckland District Law Society Library**



- 
- <sup>i</sup> Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 360
- <sup>ii</sup> Rosalie M. Sanderson, "The Continuing Saga of Professional End-Users: Law Students Search Dialog at the University of Florida," *Online* (Nov 1990): 64
- <sup>iii</sup> Silverstein, Steven H. 1990. An Index Model for Query Formulation. *Legal Reference Services Quarterly* 10 (3): 115
- <sup>iv</sup> Mary Kelly, "Lawyers need Training to Use Legal Databases," *Canterbury Tales* (Feb 1990): 3-4
- <sup>v</sup> *Ibid*, 3
- <sup>vi</sup> *Ibid*, 3
- <sup>vii</sup> Anita Morse and Miranda Lee Pao, "A Decision Tree for End User Searching in a Large Interactive Legal Database," in *Proceedings of the 15<sup>th</sup> National Online Meeting 1994* ed Martha E. Williams, (New York: Learned Information Inc, 1994) argue that "To be effective in searching a given database, the searcher should be thoroughly familiar with the file content; file structure, record structure, search features applicable to and constraints unique to the database"; Rosalie M. Sanderson, "The Continuing Saga of Professional End-Users: Law Students Search Dialog at the University of Florida," *Online* (Nov 1990): 64-69 notes that a frequent problem is the choice of databases in DIALOG, LEXIS and WESTLAW and suggests that librarians will probably always have a role in helping select appropriate database.
- <sup>viii</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 249 argues that "One area of bibliographic instruction that would clearly benefit searchers in advance is the most appropriate use of the various catalogs and databases available online. In this study searchers frequently switched to others beyond the home catalog. Some of the switches obviously were inappropriate, such as searches in the uncover databases for authors long since deceased"; Betsy Baker and Beth Sandore, "The Online Catalog and Instruction: Maintaining the Balance on the Log, " in *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey (Colorado: Libraries Unlimited Inc, 1987)
- <sup>ix</sup> Mary Kelly, "Lawyers need Training to Use Legal Databases," *Canterbury Tales* (Feb 1990): 3
- <sup>x</sup> Jon Bing, "Performance of Legal Text Retrieval Systems: The Curse of Boole," *Law Library Journal* 79 (1987): 187-202
- <sup>xi</sup> Silverstein, Steven H. 1990. An Index Model for Query Formulation. *Legal Reference Services Quarterly* 10 (3): 115-124
- <sup>xii</sup> This approach may be better applied in the United States where law students and practitioners are familiar with the West's heavily indexed system of reported and Key Numbers.
- <sup>xiii</sup> Anita Morse and Miranda Lee Pao, "A Decision Tree for End User Searching in a Large Interactive Legal Database," in *Proceedings of the 15<sup>th</sup> National Online Meeting 1994* ed Martha E. Williams, New York: Learned Information Inc, 1994) note that a lawyer will usually have (1) relevant facts (2) legal concepts and (3) previous cases and their citations, when they are researching a case.
- <sup>xiv</sup> Mary Kelly, "Lawyers need Training to Use Legal Databases," *Canterbury Tales* (Feb 1990): 3
- <sup>xv</sup> Silverstein, Steven H. 1990. An Index Model for Query Formulation. *Legal Reference Services Quarterly* 10 (3): 119
- <sup>xvi</sup> *Ibid*, 119
- <sup>xvii</sup> Anita Morse and Miranda Lee Pao, "A Decision Tree for End User Searching in a Large Interactive Legal Database," in *Proceedings of the 15<sup>th</sup> National Online Meeting 1994* ed Martha E. Williams, (New York: Learned Information Inc, 1994), 338
- <sup>xviii</sup> Jon Bing, "Performance of Legal Text Retrieval Systems: The Curse of Boole," *Law Library Journal* 79 (1987): 198
- <sup>xix</sup> Edward Jacobs, "Teaching Students to use Full Text Online Databases: Course Design and Integration" *The Law Librarian* 19 no. 2 (1988): 53-56
- <sup>xx</sup> Betsy Baker and Beth Sandore, "The Online Catalog and Instruction: Maintaining the Balance on the Log, " in *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey (Colorado: Libraries Unlimited Inc, 1987), 202
- <sup>xxi</sup> *Ibid*, 203

---

<sup>xxii</sup> Betsy Baker and Beth Sandore, "The Online Catalog and Instruction: Maintaining the Balance on the Log," in *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey (Colorado: Libraries Unlimited Inc, 1987), 194

<sup>xxiii</sup> Joan K. Lippincott, "End-User Instruction: Emphasis on Concepts," in *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey, (Colorado: Libraries Unlimited Inc, 1987), 183; Mary M. Huston, "Search Theory and Instruction for End Users of Online Bibliographic Information Retrieval Systems: A Literature Review," *Research Strategies* (Winter 1989): 29 stated that "Procedural instructions are inadequate; popular explanations are misleading; and educators have been slow to adopt conceptual models"; Mara R. Saule, "User Instruction Issues for Databases in the Humanities," *Library Trends* 40 no. 4 (1992): 596 suggests that training should teach concepts rather than keystrokes; Betsy Baker, Mary M. Huston and Maureen Pastine, "Making Connections: Teaching Information Retrieval" *Library Trends* 39, no. 3 (1991): 213 note that "Various user studies have found that instruction for searching must provide not only basic procedural information but also conceptual knowledge. Knowledge of database structure, for instance, is fundamental to retrieval in diverse systems"; Judy Ala & Kathy Cerebona, "Boolean Searches: A Life Skill," *School Library Journal* (Nov 1992): 42 argue that "Students need to learn the specifics for the computer software they are using, but the logic behind the search strategy will transfer between applications"; Christine L Borgman, "Why are Online Catalogs So Hard to Use?" *Journal of the American Society for Information Science* 37 (November 1986): 388 as cited in Mary M. Huston, "Search Theory and Instruction for End Users of Online Bibliographic Information Retrieval Systems: A Literature Review," *Research Strategies* (Winter 1989): 14-15 stated that "Recent research ... has determined that 'only when the conceptual aspects are understood can the user exploit the system fully' and that 'If the goal of the end-user curriculum is that students will be able to transfer their knowledge and make use of a wide variety of electronic information systems, then it is important that the curriculum be developed around concepts'"

<sup>xxiv</sup> Edward Jacobs, "Teaching Students to use Full Text Online Databases: Course Design and Integration" *The Law Librarian* 19 no. 2 (1988): 55

<sup>xxv</sup> *Ibid*, 55

<sup>xxvi</sup> Betsy Baker and Beth Sandore, "The Online Catalog and Instruction: Maintaining the Balance on the Log," in *Conceptual Frameworks for Bibliographic Education: Theory into Practice* ed. Mary Reichel and Mary Ann Ramey (Colorado: Libraries Unlimited Inc, 1987), 195

<sup>xxvii</sup> Judy Ala and Kathy Cerebona, "Boolean Searches: A Life Skill," *School Library Journal* (Nov 1992): 42.

<sup>xxviii</sup> Teresa Pritchard-Schoch, "Teaching Online Legal Research," *Online* (Nov 1993): 106

<sup>xxix</sup> Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 402

<sup>xxx</sup> Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 402

<sup>xxxi</sup> Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 124

<sup>xxxii</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 239

<sup>xxxiii</sup> Alice J Vollaro and Donald T Hawkins, "End-User Searching in a Large Library Network: A Case Study of Patent Attorneys," *Online* (July 1986): 67-72

<sup>xxxiv</sup> *Ibid*, 68

<sup>xxxv</sup> *Ibid*, 69

<sup>xxxvi</sup> Rosalie M. Sanderson, "The Continuing Saga of Professional End-Users: Law Students Search Dialog at the University of Florida," *Online* (Nov 1990): 64-69

<sup>xxxvii</sup> *Ibid*, 68

<sup>xxxviii</sup> *Ibid*, 65

<sup>xxxix</sup> Weijing Yuan, "End-User Searching Behavior in Information Retrieval: A Longitudinal Study," *Journal of the American Society for Information Science* 48 no. 3 (1997): 218-234

<sup>xl</sup> A recent and important review of studies on OPAC searching is provided by Large & Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 111-133. Brendan J. Wyly, "From Access Points to Materials: A Transaction Log Analysis of Access Point

Value for Online Catalog Users," *Legal Resources and Technical Services* 40 no. 3 (1996): 211-236 includes literature review 1979-1987. Some Actual OPAC Studies include: Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 267-273; Pat Ensor, "User Characteristics of Keyword Searching in an OPAC," *College and Research Libraries* Jan (1992): 72-80; Sammy R Alzofon and Noelle Van Pulis, "Patterns of Searching and Success Rates in an Online Public Access Catalog," *College and Research Libraries* (March 1984):111-235; Jacqueline Mancall, "Examining the Successful Retrieval of Information by Students Using Online Databases," *School Media Quarterly* (Summer 1988): 256-259; Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 395-402; Brendan Wyly, "From Access Points to Materials : A Transaction Log Analysis of Access Point Value for Online Catalog Users," *Library Resources and Technical Services* 40 (July 1996): 211-236; Weijing Yuan, "End-User Searching Behavior in Information Retrieval: A Longitudinal Study," *Journal of the American Society for Information Science* 48 no. 3 (1997): 218-234; "The User meets Melvyl System" by M Berger *DLA Bulletin* 16, no. 1 (Fall 1996): 13-21; "Transaction Logs: Gathering Information about Melvyl" by Ray Larson 4, no. 2 (October 1984): 17-18; Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 239-252; Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 111-133

<sup>xli</sup> Jacqueline Mancall, "Examining the Successful Retrieval of Information by Students Using Online Databases," *School Media Quarterly* (Summer 1988): 256-259 considered the impact of search task, skills of searcher and characteristics of the system on search success and found that students are capable of conducting own searches, but better at simple, rather than complex tasks.

<sup>xlii</sup> Janet L. Nelson, "An Analysis of Transaction Logs to Evaluate the Educational Needs of End Users," *Medical Reference Services Quarterly* 11 no. 4 (1992): 11-21; Mitchell Aaron Cahan, "Grateful MED: A Tool for Studying Search Behaviour" *Medical Reference Services Quarterly* 8, no. 4 (Winter 1989): 61-79; Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 360-373

<sup>xliii</sup> Terry Ballard, "Library Systems: Transaction Log Analysis Fever," *Information Today* 13, no. 6 (1996): 56

<sup>xliv</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 241

<sup>xliv</sup> Christine Borgman, "Why are Online Catalogs Hard to Use? Lessons Learned from Information-Retrieval Studies," *Journal of the American Society for Information Science* 37, no. 6 (1986): 387

<sup>xlv</sup> Ibid, 390

<sup>xlv</sup> Ibid, 394

<sup>xlviii</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 2-40

<sup>xlix</sup> Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 568-583

<sup>i</sup> Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1991): 116

<sup>li</sup> Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 20

<sup>lii</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 240; R.E. Rice and C L Borgman, "The Use of Computer-Monitored Data in Information Science and Communication Research" *Journal of the American Society for Information Science* 34 (1983): 247-256 as cited in Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 569

<sup>liii</sup> S. Jones, M. Gatford, T. Do and S. Walker, "Transaction Logging," *Journal of Documentation* 53, no. 1 (1997): 35-50; Thomas A. Peters, "The History and Development of Transaction Log Analysis"

---

*Library Hi-Tech* 11, no. 2 (1993): 41-66; Patricia Flaherty, "Transaction Logging Systems: A Descriptive Summary," *Library Hi-Tech* 11, no. 2 (1993): 67-78; Neal Kaske, "Research Methodologies and Transaction Log Analysis," *Library Hi-Tech* 11, no. 2 (1993): 79-86; Beth Sandore, "Applying the Results of Transaction Log Analysis," *Library Hi-Tech* 11, no. 2 (1993): 87-97; Martin Kurth, "The Limits and Limitations of Transaction Log Analysis," *Library Hi-Tech* 11 (2): 98-104; Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 568-583; Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 20-25; Terry Ballard, "Library Systems : Transaction Log Fever," *Information Today* 13, no. 6 (1996):56

<sup>liv</sup> Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 402; Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 272; Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 361

<sup>lv</sup> Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 402

<sup>lvi</sup> Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 20

<sup>lvii</sup> Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 361; Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 20; Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 120 "As Connaway et al (1995) argue, transaction logs provide a record of what the searchers did rather than what they say they did."

<sup>lviii</sup> Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 21; Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 570; Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 271 notes that "Transaction Log Analysis does not record the users needs or intentions, nor does it measure their satisfaction. These need to be studied through subjective user responses obtained by surveys and focus group sessions"; Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 361; Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 120 note that "It is also extremely difficult to know the users ultimate objective for the search or whether from the users perspective, it was achieved. Both the searchers motives and the searchers reaction to retrieved records remains unknown to even the most perspicacious of researchers"; "Although transaction monitoring offers unprecedented opportunities to study search failures in document retrieval systems and provides highly detailed information about how users actually interact with an online system ... it cannot reveal their intentions or whether they are satisfied with the results" Ray R. Larson, "The Decline of Subject Searching: Long Term Trends and Patterns of Index Use in an Online Catalog," *Journal of American Society for Information Science* 42 (April 1991):198 as cited in Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 13

<sup>lix</sup> Brendan J. Wyly, "From Access Points to Materials: A Transaction Log Analysis of Access Point Value for Online Catalog Users," *Legal Resources and Technical Services* 40 no. 3 (1996): 213

<sup>lx</sup> Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 120; Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 13

<sup>lxi</sup> Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 21 observes that "Where collecting the data often is deceptively easy, analysing them can be difficult, expensive and time-consuming"; Andrew Large

---

and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 120

<sup>lxii</sup> "Their (Hancock-Beauleu, McKenzie & Irving) study highlights the benefits of enhancing Transaction Log Analysis with other analytical methods" Brendan J. Wyly, "From Access Points to Materials: A Transaction Log Analysis of Access Point Value for Online Catalog Users," *Legal Resources and Technical Services* 40 no. 3 (1996): 212; Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 120; Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 31; Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 568-583

<sup>lxiii</sup> Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 579

<sup>lxiv</sup> Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 267

<sup>lxv</sup> Weijing Yuan, "End-User Searching Behavior in Information Retrieval: A Longitudinal Study," *Journal of the American Society for Information Science* 48 no. 3 (1997): 218; Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 249 states that "Disregarding individual differences, many use such services as an OPAC infrequently, and even regular users simply are unwilling to take the time and effort to develop advanced searching skills."

<sup>lxvi</sup> Elizabeth Nash, "Teaching Students to use Full Text Online Databases: Changing the Climate," *The Law Librarian* 19 no. 2 (1988): 49

<sup>lxvii</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 249

<sup>lxviii</sup> Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 365 reports that "Searching for articles according to subject was the most frequently used mode of searching with 75% for medical students and 84% house officers." and notes that "Studies of other end-user systems for searching MEDLINE have reported similar findings. For Example Swell and Titelbaum reported that 13.5% of the searches in their study of end-user searching of NLM databases were performed for information about an author, while the remainder of the searches looked for information about a subject. Similarly, Naomi C. Broering observed that less than 5% of the searches in miniMEDLINE were for articles by an author. Likewise, Ann B. Hubble found that approximately 70% of the users of MELVYL-MEDLINE at UCLA were searching for information on a subject."

<sup>lxix</sup> Fred M. Greguras, "Legal Research," in *Online Search Strategies*, ed. Ryan E. Hoover, 213-239, (New York: Knowledge Industry Publications Inc, 1982)

<sup>lxx</sup> Five predominant search strategy models presented by Markey and Atherton (no citation given) which were based upon earlier unpublished work of Bourne, Anderson and Robinson as set out and discussed in Mary M. Huston, "Search Theory and Instruction for End Users of Online Bibliographic Information Retrieval Systems: A Literature Review," *Research Strategies* (Winter 1989): 18

<sup>lxxi</sup> Fred M Greguras, "Legal Research," in *Online Search Strategies*, ed. Ryan E. Hoover, 213-239. (New York: Knowledge Industry Publications, Inc, 1982)

<sup>lxxii</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 247

<sup>lxxiii</sup> Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 262

<sup>lxxiv</sup> M J Bates, "The Design of Browsing and Berrypicking Techniques for the Online Search Interface *Online Review* 13, no. 5 (1989): 407-424 as cited in Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 571



- 
- <sup>lxxv</sup> Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 269
- <sup>lxxvi</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 250 observes that "Their loss as to how to proceed was expressed in several ways: repeated researches on the same terms; complete abandonment; re-searches in other, inappropriate databases."
- <sup>lxxvii</sup> Rita Reusch, "The Search for Analogous Legal Authority: How to find It When You Don't Know What You're Looking For?" *Legal Reference Services Quarterly* 4 no. 3 (1984): 33-38
- <sup>lxxviii</sup> C H Fenichel, "Online Searching: Measures that Discriminate Among Users with Different Types of Experience," *Journal of the American Society for Information Science* 32, no. 1 (1981): 23-32 as cited in Christine Borgman, "Why are Online Catalogs Hard to Use? Lessons Learned from Information-Retrieval Studies," *Journal of the American Society for Information Science* 37, no. 6 (1986): 388
- <sup>lxxix</sup> "Peters and other studies have reported low use of special features such as call number searching or Boolean searching. The data gathered by this study are consistent with these claims", Rhonda N Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis" *RQ* (Spring 1991): 399
- <sup>lxxx</sup> Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 271
- <sup>lxxxi</sup> Janet L. Nelson, "An Analysis of Transaction Logs to Evaluate the Educational Needs of End Users," *Medical Reference Services Quarterly* 11 no. 4 (1992): 19
- <sup>lxxxii</sup> Weijing Yuan, "End-User Searching Behavior in Information Retrieval: A Longitudinal Study," *Journal of the American Society for Information Science* 48 no. 3 (1997): 231
- <sup>lxxxiii</sup> Judy Ala & Kathy Cerebona, "Boolean Searches: A Life Skill," *School Library Journal* (November 1992): 41
- <sup>lxxxiv</sup> Weijing Yuan, "End-User Searching Behavior in Information Retrieval: A Longitudinal Study," *Journal of the American Society for Information Science* 48 no. 3 (1997): 231
- <sup>lxxxv</sup> *Ibid*, 231 citing C. Tenopir and J. S. Ro, *Full Text Databases* (New York: Greenwood Press, 1990)
- <sup>lxxxvi</sup> Jon Bing, "Performance of Legal Text Retrieval Systems: The Curse of Boole," *Law Library Journal* 79 (1987): 193
- <sup>lxxxvii</sup> *Ibid*, 193
- <sup>lxxxviii</sup> *Ibid*, 193
- <sup>lxxxix</sup> *Ibid*, 193
- <sup>xc</sup> Janet L. Nelson, "An Analysis of Transaction Logs to Evaluate the Educational Needs of End Users," *Medical Reference Services Quarterly* 11 no. 4 (1992): 18
- <sup>xc i</sup> Cheryl Kern-Simirenko, "OPAC User Logs: Implications for Bibliographic Instruction," *Library Hi-Tech* 1 (Winter 1983): 32 as cited by Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 271
- <sup>xc ii</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 13
- <sup>xc iii</sup> An example is provided by Terry Ballard, "Library Systems: Transaction Log Fever," *Information Today* 13, no. 6 (1996): 86
- <sup>xc iv</sup> Thomas Peters, "When Smart People Fail: An Analysis of the Transaction Log of an Online Public Access Catalog," *The Journal of Academic Librarianship* 15 no. 5 (1987): 271; Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 12
- <sup>xc v</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 12
- <sup>xc vi</sup> *Ibid*, 12
- <sup>xc vii</sup> *Ibid*, 9
- <sup>xc viii</sup> Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 361; Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no.
-

- 
- 1 (1992): 10; Thomas Peters, "Using Transaction Log Analysis for Library Management Information," *Library Administration & Management* 10 no. 1 (1996): 21
- <sup>xcix</sup> Blair & Maron, "An Evaluation of Retrieval Effectiveness for a Full-Text Document-Retrieval" *Com. A.C.M.* 28 (1985): 296 as cited by Jon Bing, "Performance of Legal Text Retrieval Systems: The Curse of Boole," *Law Library Journal* 79 (1987): 196
- <sup>c</sup> Anita Morse and Miranda Lee Pao, "A Decision Tree for End User Searching in a Large Interactive Legal Database," in *Proceedings of the 15<sup>th</sup> National Online Meeting 1994* ed Martha E. Williams, (New York: Learned Information Inc, 1994), 335
- <sup>ci</sup> Patricia M. Wallace, "How Do Patrons Search the Online Catalog When No One's Looking? Transaction Log Analysis and Implications for Bibliographic Instruction and System Design," *RQ* 33 no. 2 (1993): 243
- <sup>cii</sup> Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 114
- <sup>ciii</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 10; Alice J Vollaro and Donald T Hawkins, "End-User Searching in a Large Library Network: A Case Study of Patent Attorneys," *Online* (July 1986): 69 notes that "In patent searching, comprehensives is critical because completeness of the search determines whether an invention is unique and patentable". It is interesting to note that in this study it was found that searches were not necessarily complete but the attorneys 'obviously felt that they fulfilled some need'; Natalie Schoch King, "Search Characteristics and the Effects of Experience on End Users of PaperChase," *College & Research Libraries* (July 1991): 372 states that the information needs of medical students or house officers may be amenable to quick and possibly incomplete answers. The needs of other end-users (eg: researchers, grant seekers, textbook writers) may be substantially greater.
- <sup>civ</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 6
- <sup>cv</sup> *Ibid*, 8
- <sup>cvi</sup> *Ibid*, 30
- <sup>cvi</sup> Yasar Tonta, "Analysis of Search Failures in Document Retrieval Systems: A Review," *Public-Access Computer Systems Review* 3 no. 1 (1992): 8
- <sup>cvi</sup> Jon Bing, "Performance of Legal Text Retrieval Systems: The Curse of Boole," *Law Library Journal* 79 (1987): 196
- <sup>cix</sup> *Ibid*, 197
- <sup>cx</sup> Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 124
- <sup>cx</sup> Rhonda N. Hunter, "Successes and Failures of Patrons Searching the Online Catalog at a Large Academic Library: A Transaction Log Analysis," *RQ* 30 (Spring 1991): 402; Andrew Large and Jamshid Beheshti, "OPACs: A Research Review," *Library & Information Science Research* 19 (1997): 124
- <sup>cxii</sup> Janet L. Nelson, "An Analysis of Transaction Logs to Evaluate the Educational Needs of End Users," *Medical Reference Services Quarterly* 11 no. 4 (1992): 19
- <sup>cxiii</sup> Christine L Borgman, Sandra G Hirsh and John Hiller, "Rethinking Online Monitoring Methods for Information Retrieval Systems: From Search Product to Search Process," *Journal of the American Society for Information Science* 47 no. 7 (1996): 575
- <sup>cxiv</sup> Tefko Saracevic and Paul Kantor, "Online Searching: Still an Imprecise Art," *Library Journal* (1 Oct 1991): 47-51
- <sup>cxv</sup> Fred M. Greguras, "Legal Research," in *Online Search Strategies*, ed. Ryan E. Hoover, (New York: Knowledge Industry Publications Inc, 1982), 213
-