

**STATISTICS FOR MARKETING:  
A SELECTED ANNOTATED BIBLIOGRAPHY**

**Prepared by  
George L. Wrenn  
Assistant Head of Cataloging  
UCLA Hugh & Hazel Darling Law Library**

## Table of Contents

<b>Preface</b> .....	1
<b>Acknowledgments</b> .....	1
<b>I. U.S. Law Library Statistics</b> .....	2
<b>Statistical Compilations</b> .....	2
<b>Books</b> .....	4
<b>Articles</b> .....	4
<b>Internet Resources</b> .....	5
<b>Computer files</b> .....	7
<b>Sound Recordings</b> .....	7
<b>II. U.S. Library Statistics</b> .....	9
<b>Statistical Compilations</b> .....	9
<b>Books</b> .....	10
<b>Book Chapters</b> .....	12
<b>Articles</b> .....	13
<b>Internet Resources</b> .....	20
<b>Sound Recordings</b> .....	22
<b>III. General Statistics</b> .....	23
<b>Internet Resources</b> .....	23
<b>Books</b> .....	23

## **Preface**

This bibliography includes material on library statistics and their use as a marketing tool. Although the literature on the use of statistics for marketing is limited, many authors discuss the subject tangentially. Many of the citations pertain to academic libraries, though I have included items on non-academic libraries as well. The citations reflect topics that have become important in recent years: E-metrics, benchmarking, and performance assessment.

I have focused on statistical practices in the United States and divided the material into three parts: U.S. Law Library Statistics, U.S. Library Statistics, and General Statistics. Within the first two parts, all statistical compilations are grouped together regardless of material type.

This bibliography covers items published from 1995 to 2003 (I completed searching in December, 2003), with significant law-related materials published prior to 1995, such as statistical compilations and AALL annual meeting program tapes, also included. Material types include books, book chapters, serials, periodical articles, Internet resources, computer files, and sound recordings.

I consulted the following sources:

ABI-Inform  
ArticleFirst  
Emerald  
FirstSearch  
HeinOnline  
Google  
LexisNexis Academic  
Library Literature & Information Science  
LISA: Library and Information Science Abstracts  
Social Sciences Citation Index  
WestLaw  
WorldCat

## **Acknowledgments**

I would like to thank the following people: Leonette Williams, coordinator of the Marketing Toolkit bibliographers, Susan Lewis-Somers, who shared drafts of the statement accompanying this bibliography, Pauline Aranas, who brought the project to my attention, and Laura Cadra, who helped with searching.

## I. U.S. Law Library Statistics

### Statistical Compilations

*ARL Academic Law Library Statistics*. Washington, DC: Association of Research Libraries, 1999-.

This annual publication reports on collections, expenditures, staffing, and user services in the law libraries of ARL university institutions. Chiefly tables, it includes the questionnaire sent to member libraries. From 1992 to 1998 it was issued with the title: *ARL Academic Law and Medical Library Statistics*.

*AALL Biennial Salary Survey and Organizational Characteristics*. Chicago, IL: The American Association of Law Libraries, 1995-.

The American Association of Law Libraries reports on salaries at Academic, Private Firm/Corporate, and State, Court and County Law Libraries. Also available online to AALL members.

*California Library Statistics*. Sacramento, CA: Library Development Services Bureau, 1983-.

Issued annually, this State of California publication includes statistics on public, academic, special, and county law libraries.

*Federal Libraries and Information Centers in the United States, 1994: A Report*. Washington, DC: U.S. Dept. of Education, Office of Educational Research and Improvement, 1996.

A report prepared for the National Center for Education Statistics by the Governments Division, Bureau of the Census. Ninety law libraries or information centers are represented in the survey.

*Law Library Benchmarks*, 2003 ed. New York, NY: Primary Research Group, Inc., 2002.

From the publisher: "This report presents data from 80 American law libraries including 55 from major American law firms and 15 from American law schools."

From MarketResearch .com: "Law Library Benchmarks presents detailed data for academic, law firm, corporate law office, courthouse, federal and other legal libraries concerning their use of emerging electronic information resources and their strategy for exploiting and purchasing these resources. The report includes chapters on databases, legal web sites, CD-ROM, new and used legal books, electronic and print journals, electronic and print directories, site licenses, legal info web sites, and much much more. The report examines the attitude of law firms, law schools and government bodies towards the future of their legal libraries, and looks at the level of virtual and physical user traffic in law libraries. The report presents data for government, law firm and law school law libraries and also breaks out data on a per partner basis. 80 law libraries participated including many from major law firms and law schools."

*The Law Library Budget & Expenditure Report*, 1999 ed. New York NY: Primary Research Group, Inc., 1999.

From the publisher's web site: "The *Law Library Budget & Expenditure Report* looks at spending, acquisitions, and information delivery in college, government, and private law libraries throughout North America. Our comprehensive survey of 88 randomly-chosen law libraries provides detailed spending and other information on books, journals, audio and video materials, CD-ROM databases, the internet, cataloging systems, and computer workstations. The report helps librarians to adapt to the changing economics of database acquisition and leasing, emerging internet strategies, and more." Previously issued in 1992.

*Law Library Comprehensive Statistical Table*. Indianapolis, IN: Office of the Consultant on Legal Education, American Bar Association, 1990-. Before 1989, this American Bar Association report on the annual questionnaire was titled *Law School Library Statistics*.

*Private Law Libraries, a Survey of Compensation, Operations, and Collections*. Chicago, IL: Altman & Weil, Inc., 1988-1991. Three editions were issued from 1988 to 1991. Surveys for 1988 and 1990 were conducted by Altman & Weil for the American Association of Law Libraries, Private Law Libraries Special Interest Section. The 1991 survey (3d ed.) was conducted by the Special Libraries Association.

Lewis, Alfred J. *1969 Statistical Survey of Law School Libraries and Librarians*. 63 *Law Library Journal* 267 (1970). This compilation by the AALL Statistics Committee under Alfred J. Lewis is based on the first ABA statistical survey of law school libraries.

*Survey of Academic & Special Libraries*, 2001 ed. New York, NY: Primary Research Group, Inc., 2000. Publisher's description: "The Survey of Academic & Special Libraries is based on detailed surveys of 20 law libraries, 23 corporate libraries, 22 hospital and healthcare libraries and 65 academic libraries in the USA & Canada. The report's more than 500 tables of data present an extraordinary statistical map of the purchasing policies and technology practices of academic & special libraries in North America. Among the issues covered are spending on and negotiating with major commercial online services, the use of web-based niche information suppliers, use of CD-ROM, traditional and electronic document delivery services, use of various search engines, and spending on books, cataloging systems, training, electronic and print journals and much more. Data is broken out by size and type of library with separate presentations for academic, medical, legal, corporate and government libraries."

*Survey of Law Firm Economics*. Ardmore, PA: Altman Weil, Inc., n.d. This annual survey report has been published for thirty-one years and includes statistics on compensation of library personnel.

## **Books**

*Gathering Statistics for Your Law Library Handbook*. In *Law Librarians Making Information Work*. Chicago, IL: American Association of Law Libraries, 1996.

From the Introduction: “This handbook was designed to help law librarians collect the statistics and financial measurements that can help advance their overall goals. [...]

Contents include: Tips for getting started in statistics collection, Examples of the types of statistics that can be compiled and how they can be used, Sample library budgets and statistical tables.”

The handbook was prepared by the American Association of Law Libraries Task Force on the Value of Law Libraries.

Kyrillidou, Martha. *ARL Academic Law and Medical Library Statistics 1992-93 to 1994-95*. Washington, DC: Association of Research Libraries, 1996.

Publisher’s description: “*ARL Academic Law and Medical Library Statistics 1992-93 to 1994-95* is the sequel to *ARL Academic Law and Medical Library Statistics 1977-78 to 1991-92*. It presents data on a wide range of topics for academic law and medical libraries including collections size and growth, materials and operating expenditures, staffing, and public service activities. The report compares law and medical libraries to the larger research collections in each research university. It also includes a trend analysis of monograph and serial prices in law and medical libraries, along with trends in the growth of collections, expenditures, and interlibrary loan activities.”

Rubin, Rhea Joyce. *California County Law Library Use Study: A Report to the Sonoma County Law Library*. n.p.: Rhea Joyce Rubin, 1996.

For a project funded by the U.S. Department of Education, Rhea presents the results of a county law library user survey and provides data collection forms so that “comparable, valid data can be collected by libraries in the future.”

## **Articles**

Bravy, Gary J. and K. Celeste Feather. *The Impact of Electronic Access on Basic Library Services: One Academic Law Library’s Experience*. 93 *Law Library Journal* 261 (2001).

The authors, from the Georgetown University Law Library, discuss the implications of a 10-year decline in the Library’s traditional use statistics (circulation, shelving, and photocopying). They show that new measures of electronic resource use would permit a more inclusive evaluation of library services.

Gasaway, Laura N. *Academic Law Library Statistics, 1876-1992*. 84 *Law Library Journal* 573 (1992).

A history of academic law library statistics focusing on efforts to improve the usefulness of the statistics gathered.

Hanrahan, Julie. *1992-93 Statistical Survey of ABA Law School Libraries and Librarians*. 86 *Law Library Journal* 617 (1994).

A report prepared by the Office of the Consultant on Legal Education to the American Bar Association.

Hu, Robert H. *ROIs Can Validate Your Library's Value*. 7 AALL Spectrum 20 (October 2002).  
The author shows how a return-on-investment assessment may be used to demonstrate a library's value.

Lewis, Alfred J. *Surveys of Law Libraries, 1973-1979*. 1980 Bowker Annual 401 (1980).  
Lewis discusses sources of statistical information and provides a bibliography. A table shows the rank and size (volume count) of U.S. Law Libraries by state and type of library.

Mersky, Roy M. *Law Library Statistics*. 1971 Bowker Annual 27 (1971).  
Includes a very brief history of law library statistical surveys and discusses the data gathered for 1970.

Rumsey, Mary. *Weighing the Pig: The Mishandling of Reference Statistics*. 5 AALL Spectrum 6 (November 2000).  
The author argues for thoughtful gathering of statistics and stresses the importance of reaching agreement on how to record statistics.

### **Internet Resources**

#### *Academic Library Peer Comparison Tool*

<http://www.nces.ed.gov/surveys/libraries/academicpeer/> (last date accessed 01/12/04).  
The National Center for Education Statistics (NCES) web site provides a history of this comparison tool: "The Academic Libraries Survey (ALS) produces descriptive statistics on about 3,700 academic libraries in the 50 states, the District of Columbia, and the outlying areas of the United States. NCES surveyed academic libraries on a three-year cycle between 1966 and 1988. Between 1988 and 1998, the ALS was a component of the Integrated Postsecondary Education Data System (IPEDS) and was collected on a two-year cycle. Beginning with FY 2000, the Academic Libraries Survey is no longer a component of IPEDS, but remains on a two-year cycle. Beginning with the collection of FY 2000 data, the ALS changed to web-based data collection. The FY 2002 data collection closed in March 2003, and are scheduled for release in 2004."

*ARL Academic Law and Medical Library Statistics, 1977-78 to 1991-92: A Guide to the Machine-Readable Version* <http://www.arl.org/stats/lawmed/lawmed.html> (last date accessed 01/12/04).

Explains data collection methods prior to 1992-93, when the ARL began collecting separate statistics for ARL Law Libraries.

*ARL Academic Law Library Statistics Questionnaire, 2002-03*

<http://www.arl.org/stats/mailling/m03/03lawsurv.pdf> (last date accessed 01/14/04).  
The latest ARL questionnaire is available on the Web.

*The Minnesota State Law Library: Website Statistics for the Year 2000*

<http://www.lawlibrary.state.mn.us/ar2000/webstat.html>

The Minnesota State Law Library created a web page to show the number of hits received by the Library's web pages in 2000, with links those pages.

Phipps, Shelley. *Beyond Measuring Service Quality: Learning from the Voices of the Customers, the Staff, the Processes, and the Organization*

<http://www.arl.org/libqual/events/oct2000msq/papers/Phipps/hipps.html> (last date accessed 01/12/04).

A presentation for the *ARL Measuring Service Quality Symposium* held in Washington, D.C. on October 20-21, 2000.

From the abstract: "As ARL libraries begin seriously to assess how well they are anticipating, meeting, and delighting students and faculty, the primary focus should be on understanding customers' needs, learning quick and clean methods of data gathering and analysis, improving critical processes, and developing internal capacity to be successful in the future. [...] The purpose of sharing macro data among ARL libraries should be to provide benchmarking information for the overall improvement of academic libraries.

The purpose of gathering service quality data should be to identify what is working well and what is not and to increase knowledge of customer requirements. Data gathering must be easy, meaningful, and clearly related to customer satisfaction for staff to commit to using performance measures. [...] Methodologies, such as LibQUAL+, can work as "pointers" to the need to study specific processes. Gathering data from the process itself is one of the most efficient methods for measuring performance and is also useful for helping staff recognize the need to change and enhance services. Using these data to develop performance and learning goals supports continuing customer focus. As the customer perspective is integrated into planning and decision-making, practicing the disciplines of the learning organization will ensure the development of the organizational capacity to respond to this new picture of reality."

Rush, Mila. *What Do ABA, ARL, and NCES Want to Know; a Crosswalk*

<http://www.aallnet.org/sis/allsis/statxw.html> (last date accessed 01/13/04).

In February 2001, Mila Rush published two tables providing comparisons of the questions asked by the *2000 ABA questionnaire*, the *1999-2000 ARL Academic Law Library Statistics Questionnaire*, and the *1998 IPEDS Academic Library Survey*.

Todd, Heather and Lisa Kruesi. *E-Statistics—Are We Comparing Apples and Oranges? Getting a Grip on E-Statistics to Measure our Performance: A University of Queensland Cybrary Perspective* <http://www.library.uq.edu.au/papers/htestatistics.pdf> (last date accessed 01/12/04).

The authors describe efforts to collect e-resource usage statistics at the University of Queensland.

## **Computer files**

*ARL Machine-Readable Data since 1977-78* <ftp://www.arl.org/stat/law/> (last date accessed 01/12/04).

Association of Research Libraries raw data from 1977-78 to date is available for download in spreadsheet format (.wk1) from the ARL FTP server. Information on how to use the 1977-78 through 1991-92 files is in: *ARL Academic Law and Medical Library Statistics, 1977-78 to 1991-92: A Guide to the Machine-Readable Version*.

## **Sound Recordings**

ABA Statistics: Tackling Topical Questions. Ajaye Bloomstone, Pauline M. Aranas, and Leonette Williams. Valencia, CA: Produced by Mobiltape Co., 2003.

A program from the 96<sup>th</sup> AALL Annual Meeting. Participants: Ajaye Bloomstone, Pauline M. Aranas, and Leonette Williams.

Articulating and Implementing Value in Law Libraries. Anne Ellis, Mark Estes, Anne, Jose Marie Griffiths, Holly Moyer, and Patricia Peterson. Valencia, CA: Duplicated by Mobiltape, 1996.

A program sponsored by the Private Law Libraries Special Interest Section. Co-coordinators: Anne Ellis and Mark Estes; speakers: Jose Marie Griffiths, Holly Moyer, and Patricia Peterson. Griffiths discusses the value of information and libraries in terms of the cost of acquiring information.

Evaluating Library Effectiveness and Quality: The Development of AALL Performance Measures in Light of ABA/AALS Accreditation Standards and Annual Statistics. M. Louise Lantzy and Charles R. McClure. Valencia, CA: Duplicated by Mobiltape, 1994.

Recorded at the AALL 87<sup>th</sup> Annual Meeting. Coordinator and moderator: M. Louise Lantzy. Speakers: M. Louise Lantzy and Charles R. McClure. Lantzy and McClure discuss the ABA questionnaire and the inadequacy of volume count as a measure of quality.

Law Library Statistics Standard. The Final Frontier: What Should We Count? How Should We Count It? Who Should Do the Counting? Bob Nissenbaum, et al. Glendale, CA: Duplicated by Mobiltape, 1987.

This program from the 80<sup>th</sup> AALL Annual Meeting was sponsored by the Statistics Committee, the Standards Committee, and the Academic Law Libraries Special Interest Section. Moderator: Bob Nissenbaum. Speakers: Marie Wallace, Jen Gabriel, Susan Borner, Richard Palmer, Kathleen Grove, and David Thomas. Perspectives on the use of library statistics by law firm libraries, state agency libraries, and academic law libraries.

Massaging Library Statistics: What is the Message? Glendale, CA: Duplicated by Mobiltape, 1986.

A program from the 79<sup>th</sup> meeting of the American Association of Law Libraries.

Who's Counting? Who Cares? Delivering the Message with Statistics. Celeste Feather, et al.  
Glendale, CA: Mobiltape, 1996.

This program from the 89<sup>th</sup> AALL Annual Meeting was sponsored by the Technical Services SIS and the Reader Services SIS. Coordinator: Celeste Feather.

## II. U.S. Library Statistics

### Statistical Compilations

*Academic Libraries: E.D. Tabs.* Washington, DC: National Center for Education Statistics, n.d.  
Publisher's description: "This report is based on information from the 2000 Academic Libraries Survey. The tables in this publication summarize library services, library staff, library collections and library expenditures for libraries in degree granting postsecondary institutions in the 50 states and the District of Columbia."

Published biennially, the 2000 report was release in November 2003 and is available at <http://nces.ed.gov/pubs2004/2004317.pdf> (last date accessed 01/12/04).

*ARL Statistics Interactive Edition.* Geospatial and Statistical Data Center of the University of Virginia Library <http://fisher.lib.virginia.edu/arl/index.html> (last date accessed 01/12/04).  
From the web site: "This site will allow you to: review the library data collected by ARL, generate rankings of institutions by selected criteria, create graphs from the data, generate summary statistics for all ARL libraries, download the data by year in spreadsheet format, review the ARL index and membership criteria."

*ARL Supplementary Statistics.* Washington, D.C.: Association of Research Libraries, 1985-  
Publisher's description: "The supplementary statistics questionnaire serves as a testbed to collect information on new measures and has yielded information on public services, government documents, and electronic measures. Questions are either finalized and moved into the main statistics questionnaire, or determined not to be of value and removed from consideration."

This publication has been issued annually since 1983-84 and is available at <http://www.arl.org/stats/sup/> (last date accessed 01/12/04).

*Developing Indictors for Academic Library Performance: Ratios from the ARL Statistics.* Washington, D.C.: ARL Statistics and Measurement, 1995-1999.

<http://www.arl.org/stats/arlstat/ratios.html> (last date accessed 01/12/04)

Superseded by: *ARL Statistics Interactive Edition.*

*Library Statistics Cooperative Program, 2002-03.* Washington, D.C.: U.S. National Commission on Libraries and Information Science, 2002, *available at*

<http://www.nclis.gov/statsurv/statist.html> (last date accessed 01/12/04).

A four-page brochure prepared for the National Center for Education Statistics by the Commission that briefly describes the surveys conducted by the Library Statistics Cooperative Program. It is frequently reissued.

*NCES Library Data Publications* <http://www.nclis.gov/statsurv/NCES/index.html> (last date accessed 01/12/04).

From the web site: "The links in this section are to the Web site at the US National Center for Education Statistics (NCES), which collects and publishes statistics on various types of libraries. The NCES site arranges its material by publication number rather than

by library type while the pages linked to here are by type of library, type of publication, and these are in chronological order.”

## **Books**

Bertot, John Carlo, et al. *Statistics and Performance Measures for Public Library Networked Services*. Chicago, IL: American Library Association, 2001.

From the Introduction: “This manual serves as a beginning point for the development, collection, and reporting of public library network statistics and performance measures.”

Cahalan, Maggie, et al. *The Status of Academic Libraries in the United States: Results from the 1996 Academic Library Survey with Historical Comparisons*. [Washington, DC]: U.S. Dept. of Education, Office of Educational Research and Improvement, National Center for Education Statistics, 2001, available at <http://nces.ed.gov/pubs2001/2001301.pdf> (last date accessed 01/12/04).

Publisher description: “This report presents a description of the status of academic libraries in 1996, a time of rapid technology-related change and increased introduction to electronic services. This report also presents detailed tabulations for 1996 and historical comparisons since 1990.”

Deutsche, Paula and Barbara P. Silcox. *Learning from Other Libraries: Benchmarking to Assess Library Performance*. 7(7) Information Outlook 18.

Abstract: “This is the second in a series of articles describing assessment activities at the National Institute of Standards and Technology (NIST) Research Library and their role in decision-making and strategic planning. A previous article described activities centered on the development, administration, and interpretation of a customer survey. A third article will discuss how the results of the customer survey and benchmark study were incorporated into the Library's operational and strategic planning.”

Egghe, Leo and Ronald Rousseau. *Elementary Statistics for Effective Library and Information Service*. London: Aslib, 2001.

This is an introductory text. Part 1 covers data gathering, sampling, and measuring scales; Part 2 covers descriptive statistics; and Part 3 covers inferential statistics.

Hafner, Arthur W. *Descriptive Statistical Techniques for Librarians*, 2d ed. Chicago, IL: American Library Association, 1998.

Hafner is a both a University Library Director and a mathematician, and this widely-cited work is both textbook and reference manual. Contents: (1) "Introduction to Statistics;" (2) "Basic Methods for Data Analysis;" (3) "Data Comparisons in the Library Environment;" (4) "Presenting Numerical Data in Tables and Charts;" (5) "Measures of Central Tendency;" (6) "Measures of Variability;" (7) "Linear Regression and Correlation Analysis;" and (8) "Sampling Strategies and Tallying a Survey."

*Library Statistics: An American National Standard Developed by the National Information Standards Organization, Approved July 24, 1995*. Bethesda, MD: NISO Press, 1997,

available at <http://www.niso.org/standards/resources/z39-7.pdf> (last date accessed 01/12/04).

Reviewed every five years, ANSI/NISO standard Z39.7 defines “useful quantifiable information to measure the resources and performance of libraries.”

Luther, Judy. *A White Paper on Electronic Journal Usage Statistics*, 2d ed. Washington, DC: Council on Library and Information Resources, 2001, available at <http://www.clir.org/pubs/reports/pub94/pub94.pdf> (last date accessed 01/12/04).

In this CLIR-commissioned report, the author identifies some of the critical issues that face librarians as they seek to obtain meaningful usage data from publishers of electronic journals. The author interviewed both librarians and publishers to determine how and what statistics are collected.

McClure, Charles R., et al. *Statistics, Measures, and Quality Standards for Assessing Digital Reference Library Services: Guidelines and Procedures*. Syracuse, NY: Information Institute of Syracuse, School of Information Studies, Syracuse University, 2002.

The purpose of this manual is to identify measures that can be used to assess and improve digital reference services. Sample forms, worksheets, logs, and surveys are provided in an appendix.

Poll, Roswitha and Peter te Boekhorster. *Measuring Quality: International Guidelines for Performance Measurement in Academic Libraries*. IFLA Publication 76. Munchen: K.G. Saur, 1996.

These guidelines, drawn up by an IFLA working group, describe how to measure quality through discrete performance indicators. The focus is on user-based performance measures.

Shim, Wonsik “Jeff”, et al. *Data Collection Manual for Academic and Research Library Network Statistics and Performance Measures*. Washington, DC: Association of Research Libraries, 2001, available at [http://www.arl.org/stats/newmeas/emetrics/phase3/ARL\\_Emetrics\\_Data\\_Collection\\_Manual.pdf](http://www.arl.org/stats/newmeas/emetrics/phase3/ARL_Emetrics_Data_Collection_Manual.pdf) (last date accessed 01/12/04).

The authors describe each statistic or measure (19 in all) according to the following criteria: definition, implementation, collected by, frequency, procedures, special consideration, and related issues.

Smith, Mark. *Collecting and Using Public Library Statistics (How-To-Do-It Manuals for Libraries, no.56)*. New York: Neal-Schuman Publishers, Inc., 1996.

A comprehensive introduction to the collection and use of public library statistic, primarily for those collecting data reported through the Federal-State Cooperative System for Public Library Data (FSCS).

Stein, John, et al, eds. *Proceedings of the 4th Northumbria International Conference on Performance Measurement in Libraries and Information Services: "Meaningful*

*Measures for Emerging Realities*". Washington, DC: Association of Research Libraries, 2002.

The topics covered by the conference papers include performance measures, service quality, data collection methods, ARL's Statistics and Measurement program, LIBQUAL+, and electronic resource statistics.

Vaughan, Liwen. *Statistical Methods for the Information Professional: A Practical Painless Approach to Understanding, Using, and Interpreting Statistics*. Medford, N.J.: Published for the American Society for Information Science and Technology by Information Today, Inc., 2001.

From the publisher's web site: "Vaughan clearly explains the statistical methods used in information science research, focusing on basic logic rather than mathematical intricacies. Her emphasis is on the meaning of statistics, when and how to apply them, and how to interpret the results of statistical analysis. Through the use of real-world examples, she shows how statistics can be used to improve services, make better decisions, and conduct more effective research."

### **Book Chapters**

Blixrud, Julia C. *Measures for Electronic Use: The ARL E-Metrics Project*. In *Statistics in Practice – Measuring & Managing* (Claire Creaser, ed.). Loughborough, Leicestershire: LISU, 2002, available at <http://www.lboro.ac.uk/departments/dis/lisu/Blixrud.pdf> (last date accessed 01/12/04).

The author, ARL Director of Information Services, describes the ARL E-Metrics Project.

Hiller, Steve. "But What Does It Mean?" *Using Statistical Data for Decision Making in Academic Libraries*. In *Statistics in Practice – Measuring & Managing* (Claire Creaser, ed.) Loughborough, Leicestershire: LISU, 2002, available at <http://www.lboro.ac.uk/departments/dis/lisu/Hiller.pdf> (last date accessed 01/12/04).

Use of statistical data in libraries varies widely. As the data collected grows, libraries "are unsure what the data mean and how to analyze and use this information in library management." The author, Library Assessment Coordinator, University of Washington Libraries, provides an overview of the University of Washington's efforts to develop measurements of library performance and service quality.

Mundt, Sebastian. *Sampling In-Library Use*. In *Statistics in Practice – Measuring & Managing* (Claire Creaser, ed.). Loughborough, Leicestershire: LISU, 2002, available at <http://www.lboro.ac.uk/departments/dis/lisu/Mundt.pdf> (last date accessed 01/12/04).

The author shows how libraries can apply sampling procedures to the collection of reference statistics.

Smith, Mark L. *Gathering and Presenting Comparative Data*. In *Library Evaluation: A Casebook and Can-Do Guide*. Englewood, CO: Libraries Unlimited, 2001.

The author briefly describes how the Public Relations Committee of the Texas Library Association created a pamphlet to present statistical data about Texas libraries.

## Articles

Abel, Eileen G., et al. *Studying the Cost and Value of Library and Information Services: Applying Functional Cost Analysis to the Library in Transition*. 47 *Journal of the American Society for Information Science* 217 (1996).

Abstract: "Library managers must respond to institutional demands for the justification of maintaining or supplementing resources and services. The difficulty of assigning costs and values to library and information services and resources is magnified by the advent of a broad variety of computerized and electronic modes of library service. This article provides a general discussion of the issues relating to costs of library and information services in the library in transition, reviews the functional cost analysis method, and presents selected data gathered from a larger study on the costs and value of various library services. The results of applying functional cost analysis to reference service show great variation in unit costs, within and across libraries, indicating that there are substantial challenges remaining in determining the sources of these variations, and in understanding the cost basis of library services."

Albanese, Andrew Richard. *Deserted No More: After Years of Declining Usage Statistics, the Campus Library Rebounds*. 128 *Library Journal* 34 (April 15, 2003).

The author briefly looks at academic libraries that have rebounded after experiencing declining usage statistics.

Bauer, Kathleen. *Indexes as Tools for Measuring Usage of Print and Electronic Resources*. 62 *College & Research Libraries* 36 (January 2001).

The Informatics Librarian at Yale's Cushing/Whitney Medical Library demonstrates how to use an index (similar to the Consumer Price Index) to measure changes in use of print and electronic collections over time.

Bauer, Kathleen. *Who Goes There? Measuring Library Web Site Usage*. 24 *Online* 25 (January/February 2000).

The author briefly explains the basics of web server log files and reviews three log analysis software packages: Analog (v.3.3), WebTrends Log Analyzer, and NetIntellect (v.4). She notes that log files can provide "useful information about the relative usage of pages on your web site, other sites that refer visitors to your site, and how search engines help people find your site, among other important data."

Bertot, John Carlo. *Library Network Statistics and Performance Measures: Approaches and Issues*. 11 *Liber Quarterly: The Journal of European Research Libraries* 224 (2001).

The author describes the efforts of the International Standards Organization, the Association of Research Libraries, and U.S. public libraries to develop library network statistics and performance measures.

Bertot, John Carlo. *Measuring Service Quality in the Networked Environment: Approaches and Considerations*. 49 *Library Trends* 758 (Spring 2001).

Abstract: “The networked environment offers libraries challenges and opportunities in a number of areas including management, service provision, and collection development. A particular challenge that libraries face in the networked environment is that of measuring and evaluating network-based services. This article offers a number of statistics and performance measures that libraries may find useful in determining the overall quality of their network-based services; identifies a number of service quality criteria; and provides a framework to assist librarians in selecting statistics and performance measures based on service quality criteria. The statistics and performance measures, criteria, and framework are the result of a number of current and past research projects conducted by the author and others across library types.”

Blecic, Deborah D., et al. *The Measurement of Use of Web-based Information Resources: An Early Look at Vendor-supplied Data*. 62 *College & Research Libraries* 434 (September 2001).

The article discusses the types of vendor-supplied data available and the problems associated with comparing data from different vendors. The authors conclude with a number of recommendations for vendors and libraries.

Cook, Colleen, et al. *LibQUAL+: Service Quality Assessment in Research Libraries*. 27 *IFLA Journal* 264 (2001).

The authors provide a brief description of the LibQUAL+ survey instrument, which “undertakes to measure library users’ perceptions of service quality and identifies gaps between desired, perceived, and minimum expectations of service.” This number of the IFLA Journal is devoted to library statistics.

Davies, J. E. *What Gets Measured, Gets Managed: Statistics and Performance Indicators for Evidence Based Management*. 34 *Journal of Librarianship and Information Science* 129 (September 2002).

Abstract: “The severe financial and supply constraints currently experienced by many libraries has highlighted the need for careful and thorough evaluation of the services provided and the application of evidence based management techniques bolstered by appropriate performance indicators. Evidence is needed to support the work of refining methods, redefining existing services and developing new ones, but what is most important is the intelligent use and interpretation of suitable evidence by those who determine policy, allocate resources and manage. Every organization needs three kinds of performance metrics for measuring: its success in mobilizing its resources; its staff’s effectiveness on the job; and its progress in fulfilling its mission. The three major functions to which statistics can be put include: monitoring operational effectiveness; providing a basis for strategic planning; and demonstrating the value obtained by users. An appropriately constructed evidence base offers the potential to support managers in a range of activity. It can form the solid underpinning for: policies; strategies; tactics; processes/operations; and advocacy. The application of library statistics is discussed with particular reference to the data collected by the Library and Information Statistics Unit, Loughborough University and the use of such data for benchmarking applications. Concludes that the collection and interpretation of evidence can not only lead to

significant service quality and improved management, but it can also enhance the level of professional satisfaction and involvement.”

Dowling, Thomas. *Lies, Damned Lies, and Web Logs*. 47 *School Library Journal* S34 (May 2001).

An overview of web log files and web log analyzers, and a discussion of what web logs can and cannot reveal.

Duy, Joanna, and Liwen Vaughan. *Usage Data for Electronic Resources: A Comparison between Locally Collected and Vendor-Provided Statistics*. 29 *The Journal of Academic Librarianship* 16 (January/February 2003).

Abstract: “Vendor-provided electronic resource usage statistics are not currently standardized across vendors. This study investigated the feasibility of using locally collected data to check the reliability of vendor-provided data. Vendor-provided data were compared with local data collected from the NCSU Libraries' Web servers. The study finds that the two types of data correlate well in terms of use patterns, but that actual usage values differ for many products.”

Fraser, Bruce T., et al. *Toward a Framework for Assessing Library and Institutional Outcomes*. 2 *portal: Libraries and the Academy* 505 (October 2002).

Abstract: “The Association of Research Libraries (ARL) E-Metrics project sought to understand how academic libraries might specify, produce, and assess institutional outcomes. This paper reviews the findings from a discussion forum, site visits, an analysis and review of accreditation standards, and a survey of ARL member directors, and offers a framework for approaching the outcomes assessment process. The paper concludes by suggesting that much work remains to integrate outcomes assessment successfully in a university setting. Moreover, multiple approaches to assessment, of which outcomes assessment is but one, are still needed for a comprehensive assessment of libraries in the broader university and societal context.”

Gorman, G.E. *Collecting Data Sensibly in Information Settings*. 26 *IFLA Journal* 115 (2000), available at <http://www.ifla.org/IV/ifla65/papers/004-120e.htm> (last date accessed 01/12/04).

This 1999 IFLA Conference paper highlights uncontrolled variables that can interfere with the objectivity of data and contaminate the analysis and interpretation of data. The author advocates “context-sensitive, sense-making collecting and analytical techniques.”

Gratch Lindauer, Bonnie. *Defining and Measuring the Library's Impact on Campuswide Outcomes*. 59 *College & Research Libraries* 546 (November 1998).

From the abstract: “Accreditation agencies, higher education institutions, and professional organizations all emphasize the importance of measuring and assessing the impacts of effects of teaching, learning, and other valued institutional activities. Academic libraries [...] also are expected to document how their performance contributes to institutional goals and outcomes. Using accreditation and ACRL sectional standards/criteria, higher education outcomes assessment research findings and recent

findings from performance effectiveness studies, this article identifies important institutional outcomes to which academic libraries contribute; describes specific performance indicators whose measures of impacts and outputs provide evidence about progress and achievement; and offers a conceptual framework of assessment domains for the teaching-learning library.”

Henczel, Sue. *Benchmarking—Measuring and Comparing for Continuous Improvement*. 6 Information Outlook 12 (July 2002).

The author discusses the benefits of benchmarking, how to develop a benchmarking process, and what to benchmark.

Hughes, Carol Ann, et al. *Communicating Resource Needs for Successful Library Services*. 13 The Bottom Line: Managing Library Finances 10 (2000).

Abstract: “Library professionals spend much of their budgeting time focused inward, allocating scarce resources among worthy competing priorities. Considerable time and skill is focused on the acquisition of the best print and electronic resources and in planning for competing infrastructure. However, less attention has been given in the literature on advice for those wishing to increase budgets for the services and programmatic offerings that are equally important for library clientele. This article attempts to address that gap.”

Janes, Joseph. *Categorical Relationships: Chi-Square*. 19 Library Hi Tech 296 (2001).

The author explains the chi-square test for relationship between two categorical variables. From a regular column, *On Research*.

Janes, Joseph. *Causality*. 19 Library Hi Tech 191 (2001).

The author briefly explains the concept of causality, and how it relates to statistical correlation. From a regular column, *On Research*.

Janes, Joseph. *Comparing the Means of Two Groups—the T-Test*. 20 Library Hi Tech 469 (2002).

The author explains how the t-test can be used to answer questions such as: “Is there a difference in usage between materials received as gifts, as opposed to those purchased by a library?” From a regular column, *On Research*.

Janes, Joseph. *Descriptive Statistics: Where They Sit and How They Fall*. 17 Library Hi Tech 402 (1999).

Using IPEDS data, the author provides a brief introduction to descriptive statistics, discussing variables, graphs, mean, median, mode, range, and standard deviation. From a regular column, *On Research*.

Janes, Joseph. *The Logic of Inference*. 19 Library Hi Tech 96 (2001).

The author briefly discusses the logic of statistical inference. From a regular column, *On Research*.

Koontz, Christine M. and Persis E. Rockwood. *Developing Performance Measures within a Marketing Frame of Reference*. 102 *New Library World* 146 (2001).

Written from a public library perspective, this article discusses measures that emphasize service outputs such as percent of population served, staff time per transaction, and cost of services per capita. The author advocates "formulation of a strategic marketing plan that incorporates the library's general information services' mission, environmental influences, target users markets, marketing strategy, and measures of productivity."

Kyrillidou, Martha. *Research Library Trends: ARL Statistics*. 26 *The Journal of Academic Librarianship* 427 (November 2000).

The author, Senior Program Officer for Statistics and Measurement, Association of Research Libraries, finds that "ARL Statistics [...] does serve the purpose of describing research libraries in a sustainable way, sheds light on scholarly communications trends by showing the decline of ownership and the growth of access, and tracks gross trend activity in library services and expenditure allocations."

Kyrillidou, Martha. *To Describe and Measure the Performance of North American Research Libraries*. 27 *IFLA Journal* 257 (2001).

The editor of the ARL's statistical publications provides a brief history of the ARL statistics program and describes the *ARL Statistics Interactive Edition*. This number of the IFLA Journal is devoted to library statistics.

Liu, Yan Quan and Douglas L. Zweizig. *The Use of Public Library Statistics by Public Library Directors*. 71 *Library Quarterly* 467 (October 2001).

The authors discuss the results of a survey designed to assess how library directors use the statistical data reported by the Public Library Data Service and the Federal-State Cooperative System for Public Library Data (FSCS). Highlights the managerial use of statistics.

Lochstet, Gwenn S. and Donna H. Lehman. *A Correlation Method for Collecting Reference Statistics*. 60 *College & Research Libraries* 45 (January 1999).

A Library Statistics Committee at the University of South Carolina's Thomas Cooper Library correlated reference statistics and door counts taken on sample weeks to calculate weekly reference statistics on non-sample weeks. The authors conclude that the correlation method offers libraries an "accurate and less time-consuming procedure for keeping reference statistics."

MacEachern, Ruth. *Measuring the Added Value of Library and Information Services: The New Zealand Approach*. 27 *IFLA Journal* 232 (2001).

The author describes the trial use of the Value Added Library Methodology (V+LM) in three New Zealand Libraries: New Zealand Parliamentary Library, Canterbury University, and Manakau Public Libraries. The methodology looks at market price of library services and value of library assets to calculate "added value derived from library usage, services, and resources." From a number of the IFLA Journal devoted to library statistics.

Peters, Thomas A. *What's the Use? The Value of E-Resource Usage Statistics*. 103 *New Library World* 39 (2002).

The author, Director of the Center for Library Initiatives, Champaign, Illinois, examines the practical benefits to be derived from usage statistics. He discusses the “e-resource usage analysis movement” and provides advice on how to get involved.

Poll, Roswitha. *Performance Measures for Library Networked Services and Resources*. 19 *The Electronic Library* 307 (2001).

From the abstract: “Traditional performance indicators were meant for libraries with print collections and lending services. [...] The paper describes the problems of data collection and gives definitions for electronic collection and the different steps of using electronic services.”

Pors, Niels Ole. *Statistics and Teaching in Departments of Library and Information Studies*. 13 *The Bottom Line: Managing Library Finances* 16 (2000).

Abstract: “Teaching some kind of research methodology takes place in nearly all departments of library and information studies. Often the units or courses do not embrace more than the simplest introduction to statistics. Teaching methods differ quite a lot and it is not usual for a person to obtain a degree without the slightest knowledge about numbers and their properties. This article describes how statistics can be used in practical situations in all types of library activities.”

Pritchard, Sarah M. *Determining Quality in Academic Libraries*. 44 *Library Trends* 572 (Winter 1996).

Abstract: “The article summarizes the attempts to define and measure quality and effectiveness in academic libraries, from traditional evaluative studies to Total Quality Management (TQM) and new research on user-defined criteria. Focusing on the organizational analysis of the library as a whole and the contribution it makes to the university or college, the article outlines a number of fundamental concepts and tools common to models of evaluation. Particular attention is then given to assessment in higher education as a whole and ways in which determinants of library quality must be linked to educational outcomes. The concluding sections suggest several areas for future research and for collaboration among library managers, educational administrators, scholars, and measurement theorists.”

Pritchard, Sarah M. *Library Benchmarking: Old Wine in New Bottles?* 21 *The Journal of Academic Librarianship* 491 (November 1995).

The author examines use of benchmarking as an evaluative statistical tool.

Saunders, E. Stewart. *Cost Efficiency in ARL Academic Libraries*. 16 *The Bottom Line: Managing Library Finances* 5 (2003).

Abstract: “Examines 88 academic member libraries of the Association of Research Libraries (ARL) to determine their relative cost efficiency, using stochastic frontier regression and data envelopment analysis (DEA) methods. Both methods give average

ARL cost efficiencies of around 80 percent. This places academic ARL libraries in the same range of efficiency as other institutions, including for-profit and non-profit institutions. Many libraries are above 80 percent efficiency. For those below, some speculation is given for the lower efficiency. The lack of an output measure for the use of electronic sources may contribute to lower efficiency for a few libraries. Large staff size and a large number of serial subscriptions do predict lower efficiency, but this is not a necessary consequence. The DEA model allows us to determine increasing, constant, or declining returns to scale for research libraries. From this, it appears research libraries with expenditures between \$10,000,000 and \$20,000,000 are operating at the most efficient scale. Since the methods used are outside the repertoire of most LIS research, a conceptual explanation is provided.”

Savage, Steve and Jodith Jones. *Developing Meaningful Statistics*. 34 *The Serials Librarian* 367 (1998).

Jones reports on a workshop held at the North American Serials Interest Group’s annual meeting in 1997, at which Steve Savage described five components of a plan developed at Wayne State University to improve serials processing statistics.

Shepherd, Peter. *Keeping Count: An International Effort Will Help Track E-Usage and Give Librarians a Key Tool to Illustrate Value*. 128 *Library Journal* 46 (February 2003). Briefly describes the history of Project COUNTER and the first release of the Project COUNTER Code of Practice.

Shim, Wonsik and Charles R. McClure. *Data Needs and Use of Electronic Resources and Services at Academic Research Libraries*. 2 *portal: Libraries and the Academy* 217 (April 2002).

The authors examine the results of the ARL E-Metrics project, a survey of twenty-four ARL libraries designed to gather information about data collection activities. Finds that a "number of libraries are not well prepared to collect, analyze, and report data related to networked resources and services."

Shim, Wonsik “Jeff”, et al. *Measures and Statistics for Research Library Networked Services: Procedures and Issues. ARL E-Metrics Phase II Report*. Washington, DC: Association of Research Libraries, 2001.

The authors present “one approach for describing and measuring some of the resources, uses, and expenditures for supporting networked services in a research library setting.” The report is a product of the ARL E-metrics project.

Stoffle, Carla and Shelley Phipps. *Meaningful Measures for Libraries*. 23 *Library Issues: Briefings for Faculty and Administrators* (March 2003)

A four-page overview of several new assessment tools: the ARL New Measures Initiative, LIBQUAL+, E-Metrics, the Project for Standardized Assessment of Information Literacy Skills (SAILS), the Technical Services Cost Study, the Inter-Library Loan/Document Delivery (ILL/DD) Performance Measures Study, and the Performance Effectiveness Management System (PEMS).

Sumsion, John. *Library Statistics for Marketing*. 27 IFLA Journal 221 (2001).

Looking at U.K. public libraries, the author shows how usage statistics can be used to assess marketing initiatives and policies. A special issue of the IFLA Journal devoted to library statistics.

Troll, Denise A. *How and Why Libraries are Changing: What We Know and What We Need to Know*. 2 portal: Libraries and the Academy 99 (January 2002).

From the abstract: "The article examines the importance of understanding how and why libraries are changing, analyzes the limitations and difficulties of traditional library performance measures, and explores environmental factors that may help account for why library use is changing. It concludes with an overview of research designed to develop an understanding of how user behavior and preferences affect demand for and use of library collections, services, and facilities, and a call to contribute conscientiously to the legacy of academic libraries and librarianship."

Young, Peter R. *Measurement of Electronic Services in Libraries: Statistics for the Digital Age*. 24 IFLA Journal 157 (1998).

This paper delivered at the 63<sup>rd</sup> IFLA Conference discusses the difficulties in measurement of electronic services, approaches to measurement, and standards for measurement. The author is Chief, Cataloging Distribution Services at the Library of Congress.

Zhang, Yvonne. *Measurement and Assessment of Networked Resources and Services in Academic Libraries*. 43(3) The Serials Librarian 71 (2003).

The author provides an overview of publications and projects of use in measuring and assessing networked resources and services. Reviews past and present initiatives and discusses assessment efforts at California State Polytechnic University, Pomona.

## **Internet Resources**

*ARL New Measures Initiative* <http://www.arl.org/stats/newmeas/newmeas.html> (last date accessed 01/12/04).

From the web site: "At the October 1999 Membership Meeting, the ARL Statistics and Measurement Committee and the ARL Research Library Leadership and Management Committee initiated the *ARL New Measures Initiative* in response to the following two needs: Increasing demand for libraries to demonstrate outcomes/impacts in areas important to the institution, Increasing pressure to maximize use of resources - benchmark best practices to save or reallocate resources."

*COUNTER Code of Practice. Release 1, December 2002*. Counter, 2002

[http://www.projectcounter.org/code\\_practice.html](http://www.projectcounter.org/code_practice.html) (last date accessed 01/12/04).

COUNTER (Counting Online Usage of Networked Electronic Resources) was launched in March 2002 and is "an international initiative designed to serve librarians, publishers

and intermediaries by facilitating the recording and exchange of online usage statistics.” Release 1 focuses on usage of journals and databases. Membership is required.

*Gathering ARL Reference Data* <http://info.med.yale.edu/library/assessment/methods.html> (last date accessed 01/12/04).

This web page from Yale University Library’s Assessment Group of the Service Quality Improvement Council describes procedures used to gather sample reference data at the Yale University libraries in 2000.

*Guidelines for Statistical Measures of Usage of Web-Based Indexed, Abstracted, and Full Text Resources.* <http://www.library.yale.edu/consortia/webstats.html> (last date accessed 01/12/04).

In November 1998, the International Coalition of Library Consortia (ICOLC) published concise guidelines on the data requirements of libraries, as well as guidelines on confidentiality, comparative statistics, and report formats and delivery mechanisms.

*Library Assessment and Benchmarking Institute (LAB 2002)*

<http://www.sla.org/content/learn/withcolleagues/LAB2002/index.cfm> (last date accessed 01/12/04).

Presentations from the 2002 Special Library Association’s Library Assessment and Benchmarking Institute are available online. Presenters include: Erik Jul (“Introducing the Balanced Scorecard”), Judith Hiott (“Evaluating and Applying Web Statistics: The Library Web Site”), Sarah Pritchard (“No Library is an Island: Finding Ground in the Culture of Assessment”), Roger Strouse (“Strategic Assessment for Information Providers”), Denise Davis (“E-Metrics: What You Need to Know to Get Started”), A. Parasuranam (“TRI/SERVQUAL/LibQUAL+”), Colleen Cook (“From SERVQUAL to LibQUAL+”), and Joanne Gard Marshall (“Valuing Ourselves and Our Work in the Information Age”).

Mercer, Linda S. *Measuring the Use and Value of Electronic Journals and Books*. 25 Issues in Science and Technology Librarianship, Winter 2000, at <http://www.library.ucsb.edu/istl/00-winter/article1.html> (last date accessed 01/14/04).

Abstract: “Much has been written on issues pertaining to licensing and archiving of digital information. Until recently, there has not been enough information to evaluate how these digital products, particularly journals, are being used. Furthermore, meaningful data are often difficult to obtain as some publishers and vendors supply little or no data or only information they feel supports the purchase of their products. As it becomes increasingly difficult to afford all digital content, librarians must be able to measure digital use of e-journals and books in order to make the best purchasing decisions for their institutions. Librarians must develop their own solutions as well as solutions in collaboration with publishers so that better evaluation of digital content use can occur.”

*NISO Z39.7-2002 Draft Standard For Trial Use, Information Services and Use: Metrics & Statistics for Libraries and Information Providers--Data Dictionary* <http://www.niso.org/emetrics> (last date accessed 01/12/04).

Comments on the draft standard were accepted through July 31, 2003. The status of Z39.7 and the work of the Standards Committee can be found on the National Information Standards Organization (NISO) web site:

[www.niso.org/committees/committee\\_ay.html](http://www.niso.org/committees/committee_ay.html) (last date accessed 01/12/04).

*University of Pennsylvania Library Data Farm*

<http://metrics.library.upenn.edu/prototype/datafarm/> (last date accessed 01/15/04).

From the web site: “The Penn Library Data Farm is a repository of quantitative information developed to aid the measurement and assessment of library resource use and organizational performance. [...] The Data Farm is a utility for staff who need quantitative information to manage resources, improve service, and assess library performance and impact. It is not a static warehouse of figures, but a more dynamic program that, to the greatest possible extent, equips staff to analyze and assess their work independently. The development of this site and the manner of its presentation are motivated by the need for empirical data that support planning and the achievement of goals, and will evolve according to this principal.”

**Sound Recordings**

Local, State and National Library Statistics. Diane Mayo, John Bertot, Amy Owens, and Sandra Nelson. Chicago, IL: American Library Association, 2000.

A program from the 2000 ALA Annual Conference, sponsored by the Public Library Association Issues and Concerns Cluster, Research and Statistics Committee. Program chair, Diane Mayo; Speakers, John Bertot, Amy Owens, and Sandra Nelson.

### III. General Statistics

#### **Internet Resources**

*Ethical Guidelines for Statistical Practice, Approved by the Board of Directors, August 7, 1999*  
<http://www.amstat.org/profession/ethicalstatistics.html> (last date accessed 01/12/04).  
Guidelines issued by the American Statistical Association, Committee on Professional Ethics. The Executive Summary states: “Statistics plays a vital role in many aspects of science, the economy, governance, and even entertainment. It is important that all statistical practitioners recognize their potential impact on the broader society and the attendant ethical obligations to perform their work responsibly.”

#### **Books**

- Jaisingh, Lloyd R. *Statistics for the Utterly Confused*. New York, NY: McGraw-Hill, 2000.  
This is a basic introduction to elementary statistics for college students and professionals.
- Phillips, J.L. *How to Think about Statistics*, 6<sup>th</sup> ed. New York, NY: Freeman, 2000.  
Phillips explains the underlying logic of statistics and basic statistical concepts.
- Tufte, Edward R. *The Visual Display of Quantitative Information*, 2d ed. Cheshire, CT: Graphics Press, 2001.  
Originally published in 1983, this now-classic account by a Yale professor shows how graphics that convey quantitative information can be used and abused.