HYPOTHESIS

THE NEWSLETTER OF THE RESEARCH SECTION OF MLA

Message from the chair
by Gary Byrd, Ph.D. (gdbyrd@buffalo.edu)

This has been another busy, productive year for the Research Section and I have enjoyed working with many of you to help promote the value of research in our professional practice. It doesn't seem possible, but we are only a month away from the end of my year as Chair and another MLA conference with exciting programs being sponsored by our Section. Jon Eldredge, who will take over as section chair after the conference, has planned two excellent invited speaker sessions highlighting various research tools we can all use to collect and analyze the data needed to provide evidence-based library services. More details on these program sessions and structured abstracts of the presentations are provided later in this issue of ***Hypothesis (pgs.2-4)***.

The three task forces I appointed late last year are all busy investigating and preparing recommendations which will be presented at our annual business meeting, Sunday morning, May 7th from 7:30 to 9:00 am in Vancouver. The first task force, chaired by Ellen Detlefsen at the University of Pittsburgh (**ellen@sis.pitt.edu**), is investigating the possibility of our Section developing one or more distance learning courses on research methods for the general MLA membership. The second, chaired by Ann Weller at the University of Illinois at Chicago (**acw@uic.edu**), is working with the MLA Credentialing Committee to review the credits offered for research activities for members of the Academy of Health Information Professionals (AHIP). The third, chaired by myself, is looking at strategies to update the Research Section mentoring service and also feeding information on our research mentors program to the new MLA Mentoring Task Force.

Our Section editors have each established editorial boards for the communication tools they edit. ***Hypothesis*** now benefits from the expertise of three other Section members in addition to Jan LaBeause who does a superb job of filling each issue with interesting and substantive reports and news. Kristin Stoklosa, our Web Site Editor, has also recruited two additional Section members to work with her to help edit and review content that will keep our membership and others interested in our activities up to date.

Finally, I wish to thank our Nominating Committee (Julie McGowan and Joan Ash) and our Secretary/Treasurer (Joyce Backus) for their excellent work in identifying and coordinating the balloting for the Section officers we elected this past month. And congratulations to our newly elected Chair-Elect (Leslie Behm, from Michigan State University's Veterinary Medical Center Library) and Section Council Representative (Dixie Jones, from the Lousiana State University Health Sciences Center Library in Shreveport). Leslie has chaired our Research Resources Committee and edited the ongoing Research Bibliography posted on our Website. Dixie is currently working on our Section Research Mentors Program Task Force. Thanks also to Julie Kelly and John Coffey who are ending several years of excellent service as our Section Council representative and alternate.

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HYPOTHESIS. The Newsletter of the Research Section of MLA

http://gain.mercer.edu/mla/research/hypothesis.html

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MLA 2000 Research Section Program

... submitted by Jon Eldredge, Ph.D.

SUNDAY, MAY 7, 2000, 4:00-5:30 PM, PROGRAM SESSION I

EVIDENCE-BASED LIBRARIANSHIP: Tools We ALL Can Use, Part 1

Moderator

Bruce Madge, The British Library, Health Care Information Services, London, United Kingdom

¨ *Randomized Controlled Trials in Librarianship*

K. Ann McKibbon, McMaster University, Health Information Research Unit, Hamilton, Ontario, Canada

Background: Randomized Controlled Trials (RCTs) are the "gold standard" research design in health care for evaluating treatments or preventive care interventions.

Objective: The speaker will describe the key characteristics of RCTs, their strengths, and their limitations. She will devote most of her presentation to describing her experiences in applying RCTs to library research with the goal of enabling audience members to undertake their own RCTs.

Methods: Narrative literature review and case study.

Results: To be reported at the time of the presentation.

Conclusions: To be reported at the time of the presentation.

♦ *Cohort Studies in Librarianship: Library Education Programs, Collection Resources Use Studies and Other Applications*

Jonathan Eldredge, MLS, PhD, The University of New Mexico, Health Sciences Center Library, Albuquerque, New Mexico, United States

Background: Cohort studies are one of the two major observational methods employed in medicine and public health. In its most generic form, a cohort consists of a population of people or objects that share

a common experience or condition. A cohort might be people who share the same geographic area, ethnic identity, age range, gender, medical condition, or other common characteristics. Medical or public health cohort studies usually follow a specified cohort over time to measure changes that occur to that cohort.

Objective: The speaker will explore the applications of cohort studies in health sciences librarianship. He also will explore some of the major advantages and disadvantages of employing cohort designs in librarianship.

Methods: Narrative literature review assisted with both online and manual searching techniques.

Results: Cohort studies are more common than might be expected as a study design in librarianship. The speaker will describe the dominant cohort design applications that can be found in library instruction and collection/resources use studies. Cohort designs also have been used to study authorship outlets for health sciences librarians, evaluating outreach programs or digital libraries, and tracking user information-seeking behavior.

Conclusions: To be reported at the time of the presentation.

♦*Ethnographic Studies in Librarianship*

Michelynn McKnight, MS/LIS, Norman Regional Hospital and Adjunct Instructor, University of Oklahoma School of Library and Information Studies, Norman, Oklahoma, United States

Objective: The speaker will briefly describe how ethnographic observation and naturalistic inquiry can be and are used to study library users' information-seeking behavior.

Methods: Narrative review of the literature

Results: How do library users seek information? How do users perceive library services? For these and other research questions, naturalistic inquiry and ethnographic observation methods are often preferable to traditional quantitative methods. Observed behavior or real-time descriptions of a user's viewpoint might render more accurate information than self-reported accounts from memory on a questionnaire.

Conclusion: Examples of ethnographic studies in librarianship suggest opportunities for wider use of these interpretive techniques alone or in conjunction with quantitative methods.

WEDNESDAY, MAY 10, 2000, 9:00-10:30 AM, PROGRAM SESSION IV

EVIDENCE-BASED LIBRARIANSHIP: Tools We ALL Can Use, Part 2

Moderator

Ana Divino Cleveland, MS, MLS, PhD, AHIP, Professor, School of Library and Information Science, Medical Informatics Program, and School of Public Health, University of North Texas, Denton, Texas, United States.

♦*Systematic Reviews and Critical Appraisal of the Library Literature: The UK Library & Information Co-operation Council (LINC) Health Panel Research Working Party Initiative*

Anne Brice, (BA (Hons) Dip Lib, ALA, Assistant Director, Health Care Unit, University of Oxford, Oxford, United Kingdom and Andrew Booth, BA, MSc, Dip Lib ALA, Director of Information Resources, School of Health & Related Research (ScHARR), University of Sheffield, Sheffield, United Kingdom.

Objective: To report on the development of two complementary approaches to stimulating use of the research literature by health care information professionals. The LINC Health Panel Research Working Party acts as a forum for the application of the principles of evidence based practice to health information work in the United Kingdom. It has highlighted two main areas for development: an investigation of the applicability of the methodologies of systematic review to the health information literature (Literature-Oriented Reviews of the Evidence [LORE]) and the refinement of existing tools and training in critical appraisal for use in the context of health information research (CRItical Skills in Appraisal for Librarians [CRISTAL].

Methods: For LORE, a feasibility study investigated the potential of systematic review methods as applied to the library literature. The topic "end-user searching" was used as an exemplar. Systematic searches were conducted across library (LISA, ISA, & Library Literature), health (CINAHL, EMBASE, MEDLINE), general sciences (Social Science Citation Index & Science Citation Index), and computing science (INSPEC & COMPENDEX) bibliographic databases together with library book catalogues and the Internet in general. For CRISTAL, triangulation was used between a review of existing critical appraisal tools for applicability to library research and *de novo* development of a critical appraisal checklist by structured assessment of the library literature.

Results: The LORE initiative has led to recommendations for both the production of literature reviews in health information and for conduct of future

See Program, page 4

Program, from page 3

research studies. The CRISTAL initiative has stimulated the development of appraisal tools that are sensitive to the specific context of health information.

♦ *The Librarian's Role Conducting a Systematic Review*

Martha (Molly) Harris, MA, MLS, VA Cochrane Center at San Antonio, South Texas Veterans Health Care System, San Antonio, Texas, United States

Background: The Veterans Evidence-Based Research Dissemination Implementation Center in San Antonio serves as one of the 14 Cochrane Collaboration centers worldwide. The most inclusive duties of the speaker consist of searching databases, managing references, revising text, and generating final bibliographies for each report.

Objective: The speaker will describe her roles as a librarian for a Cochrane Collaboration Center in compiling systematic reviews.

Method: Case study.

Results: Although some systematic reviews contain 20-30 citations, which would make manual management feasible, most reviews contain more than 50 citations requiring automated management. This presentation will utilize ProCite software to demonstrate downloading records, using individual fields to determine status of an item, creating subject bibliographies, compiling statistics, and generating the final bibliography for the systematic review.

Conclusion: Although much has been written about systematic reviews and how they surpass traditional research, very little information has been offered to explain the "nuts and bolts" involved in conducting systematic reviews. The investigators at this Cochrane Collaboration center view the librarian's multifaceted role as a critical element in this process.

Food for thought . . .

The language of research: what it says vs. what it means .....

From an anonymous e-mail posting

"A DEFINITE TREND IS EVIDENT"... These data are practically meaningless.

"WHILE IT HAS NOT BEEN POSSIBLE TO PROVIDE DEFINITE ANSWERS TO THE QUESTIONS"... An unsuccessful experiment, but I still hope to get it published.

"THREE OF THE SAMPLES WERE CHOSEN FOR DETAILED STUDY"... The other results didn't make any sense.

"TYPICAL RESULTS ARE SHOWN"... This is the prettiest graph.

"THESE RESULTS WILL BE IN A SUBSEQUENT REPORT"... I might get around to this sometime, if pushed/funded.

"IN MY EXPERIENCE"... Once

"IN CASE AFTER CASE"... Twice

"IN A SERIES OF CASES"... Thrice

"IT IS BELIEVED THAT"... I think.

"IT IS GENERALLY BELIEVED THAT"... A couple of others think so, too.

"CORRECT WITHIN AN ORDER OF MAGNITUDE"... Wrong.

"ACCORD1NG TO STATISTICAL ANALYSIS"... Rumor has it.

"A STATISTICALLY-ORIENTED PROJECTION OF THE SIGNIFICANCE OF THESE FINDINGS"... A wild guess.

"A CAREFUL ANALYSIS OF OBTAINABLE DATA"... Three pages of notes were obliterated when I knocked over a cup of coffee.

"IT IS CLEAR THAT MUCH ADDITIONAL WORK WILL BE REQUIRED BEFORE A COMPLETE UNDERSTANDING OF THIS PHENOMENON OCCURS"...I don't understand it.

"AFTER ADDITIONAL STUDY BY MY COLLEAGUES"... They don't understand it either.

"THANKS ARE DUE TO JOE BLOTZ FOR ASSISTANCE WITH THE EXPERIMENT AND TO CINDY ADAMS FOR VALUABLE DISCUSSIONS"... Mr. Blotz did the work and Ms. Adams explained to me what it meant.

"A HIGHLY SIGNIFICANT AREA FOR EXPLORATORY STUDY"... A totally useless topic selected by my committee.

"IT IS HOPED THAT THIS STUDY WILL STIMULATE FURTHER 1NVESTIGATION IN THIS FIELD"... I quit.

Bylaws Report

By Andrea L. Ball, MLS

University of Wisconsin at Madison

This year has been a quiet one for the Bylaws Committee. At last year's Annual Meeting in Chicago, the MLA membership approved the re-structuring of the Section Council. The Research Section has been advised not to amend its bylaws to reflect these changes until next year. This will give the national organization an opportunity to finalize and distribute its model bylaws, which will then be used by this Section as a framework for our amendments. Rest assured the Research Section would not be in violation of Council Bylaws by waiting to make our revisions. The national Bylaws supersede Section bylaws.

History

In 1998, the Section Council and MLA Board of Directors approved a motion to change the structure of the Council. In 1999, the MLA membership voted to approve the necessary Bylaws revisions. The new structure will become effective at the end of the Vancouver meeting, and the implementation begins with the Section elections this Spring, which have already been held.

What will change?

Two areas are affected by the changes to the Section Council structure - the role of Representative and the frequency and structure of elections. The position of alternate will be eliminated. The Representative will continue to serve a three-year term, with the first year as Representative-Elect and the last two years as Full-Representative. The Representative-Elect will spend the first year training and serving as backup.

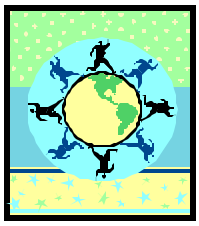
The frequency of section elections will change to every two years. Additional changes were made to the voting requirements, and proxy voting was added to the Council's procedures.

Timeline

The Council has divided all the Sections into four groups that will phase in these changes. The Research Section is part of Group I and our schedule is as follows:

- Hold elections for only the Representative in Spring 2000.
- Position of alternate eliminated at the end of the 2000 Annual Meeting.
- Representative becomes Full-Representative immediately (no Representative-Elect or training period) at the end of the 2000 Annual Meeting and will serve for three years.
- During the Spring of 2002, we will elect a Representative-Elect who will start at the end of the 2002 Annual Meeting and serve the regular three-year term.

You can find more information regarding the Section Council restructuring on MLANET: **http://www2.mc.duke.edu/misc/mla/section_council/newstructure.htm**



International
Research Reviews

Delphi survey of research priorities and identified areas for collaborative research in health sector library and information services U.K.

Submitted by Jon Eldredge, Ph.D. on behalf of Maureen Dwyer, Royal College of Nursing Library Northern Ireland

Objective:

To determine consensus-based research priorities and identified areas for collaborative research in the health sciences library and information sector (LIS) in the UK and to rate priorities as to their perceived value for the professional and impact on user needs.

Method:

A heterogeneous 34-member panel consisting of the Chairs of professional groups, journal editors, educationalists, key organisations, and representatives from the Health Libraries Group, Libraries for Nursing and University Health Science Libraries groups of the Library Association participated in a three-round postal questionnaire using the Delphi Technique.

Round I utilised an unstructured questionnaire and demographic data sheet for data collection. Content analysis was used for analysis and Round II construction.

Round II items were Likert Scale rated according to 'Value for the Professional' and 'Impact on User Needs'. SPSS was used to calculate medians and inter-quartile range. Suitability for 'collaborative research' rating was done in Round II only with percentages calculated for Yes/No alternatives.

Round III panellists re-rated a revised Round II questionnaire showing individualised statistical feedback of panellist response, group (median) response and inter-quartile range. Inter-quartiles, medians and also mean ranks were then analysised for what emerged as the final round results.

Results:

Consensus was achieved for twenty research priorities. Seventeen rated for 'Value for the Professional', seven for 'Impact on User Needs' and four showed mutual value/impact ratings. The majority of items 86% were rated as suitable for collaborative research.

Conclusion:

The consensus nature of the derived priorities may facilitate what is a developing role for LIS researchers competing and collaborating within LIS and wider health R&D sectors.

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Health Libraries Review (ISSN 0265-6647) 1999 Sep; 16(3): 174-191

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Reprints available from author. Willing to share data.

Research Spotlight

Information Behaviour of Pediatric Emergency Physicians

by Andrea Talbot

Introduction

The drive to understand physician information behaviour has received fresh impetus in recent years as the contribution of accurate, timely information to improved clinical decision-making, and thus patient care, becomes more apparent. Little is known, however, about the information behaviour of emergency physicians who arguably possess the most urgent need for point-of-care information. The objective of this exploratory study was to describe the information behaviour of pediatric emergency physicians as it occurred during daily clinical practice. Three aspects of information behaviour were examined: information needs, seeking, and use. The study focused on the physicians' need for medical knowledge as opposed to, for example, patient-specific data.

Participants/Setting

All thirteen pediatricians employed in the emergency department of a Canadian tertiary care pediatric hospital were invited to participate. There were no exclusion criteria and the participation rate was 100%. The physicians, who provide 24-hour coverage to approximately 30,000 patients per year, have access to a variety of print and electronic sources, a poison control center (located within the department) and the hospital's health sciences library.

***Editor's Note*:** Andrea Talbott holds a law degree from Bristol University, England and originally worked as a legal researcher. Most recently she worked with an academic pediatrician with whom she co-authored several papers. Andrea is involved with the Child Health Field of the Cochrane Collaboration, and recently returned to Ireland where she hopes to continue her research, particularly in the emergency setting. This study was carried out as part of the MLIS degree at Dalhousie University, Halifax, Nova Scotia, Canada, where she plans to graduate this year. Andrea presented her findings at MLA in 1999 and received the Research Section Best Paper Award. For more information she can be contacted at the School of Library and Information Studies, Faculty of Management, Dalhousie University, Halifax, Nova Scotia, Canada B3H 3J5 or via e-mail at actalbot@talk21.com.

Methodology

Based on a modified version of the methodology used by Covell et al [1], this descriptive study consisted of three phases. First, physicians completed a short preliminary questionnaire which gathered basic demographic data. Second, using a small microcassette recorder, each physician recorded clinical questions as they arose over the course of three eight-hour shifts. They also indicated how urgently answers were needed. Third, follow-up questionnaires were administered 2-8 days after the completion of each shift. The questionnaire gathered data on such issues as whether or not physicians had found answers to their questions, if answers had been found within the required time frame, physician motivation to answer questions, sources used, and the effect (if any) on current and future patient management. Statistical analysis was performed using a variety of descriptive and non-parametric tests. The statistical software used was SPSS for Windows (version 9.0, 1998).

Results

1. *Information needs:* over 39 shifts physicians recorded 117 questions, or 0.16 questions per patient seen. The range of questions raised for each shift was from 0-11, with an average of three questions asked per shift. The majority of questions related to therapy and diagnosis. Approximately 30% of questions needed answering within 15 minutes, and a further 20% within 30 minutes.

2. *Information seeking:* physicians pursued answers to 66% of questions and found answers to 58% of these. The most commonly given reason for pursuing answers was that the answer was needed for immediate patient care. Reasons giving for not pursuing answers included lack of time and patient transfer to another specialist.

The most frequently used source was print-based, followed by human resources (such as other specialists within the hospital). Reasons given for the unsuccessful pursuit of questions included not knowing where to look for an answer. Almost all answers were found to those questions needed within 15 minutes, whereas only a small percentage of answers was found to those questions which the physicians deemed less urgent.

3. *Information use:* using a modified version of categories established by Marshall in the Rochester study [2], physicians were asked to indicate if the answers had changed present patient management, or would change future management. Information retrieved was found to change both present and future management in 50% of cases. The answers found most commonly changed, or would change, management in relation to drug therapy.

Discussion

The following discussion highlights some of the results of the study:

1. Information needs: while physicians in this study asked fewer questions than reported in studies of other specialties, it is unclear whether this can be attributed to the nature of the specialty, the method of capturing questions, or individual physician characteristics. The finding that questions related mainly to therapy is consistent with earlier studies of other physician groups.

2. Information seeking: these physicians found answers to a higher proportion of questions than in other studies. Not surprisingly, most of the answers found related to those questions for which answers were needed urgently. However, it should be noted that they did not find answers to all their urgent questions. It is not known what the impact of this is. That physicians occasionally indicated that they did not know where to find an answer suggests that education might be directed towards improving their knowledge of available sources.

3. Information use: the finding that the answers retrieved changed both present and future patient management underlines the potential of clinical information both to change physician behaviour and to affect patient care directly.

Conclusion

This study provides insight into the spectrum of pediatric ER physician information behaviour from questioning to use. This knowledge is crucial in developing resources that effectively meet the information needs of clinicians in daily practice. Additionally, Bradley has noted that one of the defining features of medical librarianship lies in matching recorded knowledge with the information needs of the health professional [3]. The significance of this role will expand as information delivery moves from library to bedside, and will be dependent on increased awareness of the information behaviour patterns of physicians in clinical practice.

Bibliography

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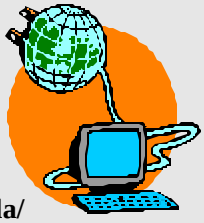
3. Bradley J. The changing face of health information and health information work: a conceptual framework. *Bulletin of the Medical Library Association*. 1996;84:1-10.

Editorial Board for Research Section Web Site



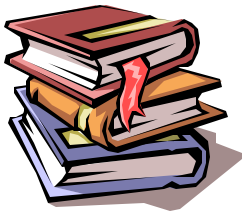
http://hubnet2.buffalo.edu/mla/

The Research Section is pleased to announce Kris Alpi and Linda Azen Martin as its Web Site Editorial Board. They will work in tandem with the Web Site Editor to support the flow of content and features for the Section's Web Site.

Kris (Markovich) Alpi is an Information Services Librarian at Weill Cornell Medical Library in New York City. She serves as Webmaster of the MLA Public Health/Health Administration and Medical Library Education Sections sites, as well as co-Webmaster of the New York-New Jersey Chapter site.

Linda Azen Martin is a consultant in the Southern California area. Her areas of expertise include Web site development and management, technology and health informatics instruction for health professionals and librarians, and Web-based instruction. She is currently a member of the MLA Continuing Education Committee (CEC), CEC Liaison to the MLANET Editorial Board, and member of the Research Section.

The Web site is a great way to reach members with announcements or Section information. Please contact the Editor at kristin_stoklosa@nih.gov or 301-594-6275 with any submissions.



Literature Review

Prepared by

Ruth E. Fenske, Ph.D.

Meho, Lokman I. And Diane H. Sonnenwald. Citation Ranking Versus Peer Evaluation of Senior Faculty Research Performance: A Case Study of Kurdish Scholarship. Journal of the American Society for Information Science. 51(2):123-138, January 15, 2000.

This study compares citation analysis and peer evaluation in the form of peer ranking, citation content analysis, and book review content analysis in assessing faculty research performance. The authors identified five Kurdologists who are currently full and associate professors "teaching at Western academic institutions who have been publishing primarily in English on the political and historical discourses of the Kurdish question." Each published at least one book prior to 1993 which was comprehensively reviewed in at least three places. Citations to the work of the five scholars under study were found in the Social Sciences Citation Index, the Arts and Humanities Citation Index, and in the bibliographies of non-book, printed works by thirty-three Kurdologists. Three hundred fifty cited works were collected and the citations were content analyzed. Reviews of books by the five scholars were also content analyzed. Twenty-eight Kurdologists were asked to rank the top twenty Kurdologists.

Citation counts were determined for each of the five scholars and they were normalized to take into account years in the field. Only five negative citations were found. The authors conclude that citation counts alone result in the same rankings as does content analysis of citations. However, since each citation yielded one "point" for positive content, it is not surprising the ranks are the same. No distinction was made between value free citations and "paying homage" citations. The authors do say they tried other weighting schemes which yielded similar results.

For book reviews, number of positive comments was divided by the number of reviews for each book. The two highest ranked scholars, as determined earlier by numbers of citations, remained the same and the others moved around in rank. Seventeen of the twenty-eight Kurdologists contacted returned peer rankings. The peer rankings were similar to those for book reviews.

Their conclusion is that "normalized citation data perform as well as peer judgments in evaluating the research performance of scholars at the high and low ends of the relative rankings." They suggest "additional evaluation methods and measures that take into account the context and content of research appear to be needed to effectively evaluate senior scholars whose performance ranks relatively in the middle." They suggest that citation content analysis may be useful in evaluating middle performers, but say further analysis and research is needed. Later they say they are "confident. . . especially when senior scholars in the context of a smaller research speciality areas are compared one to another."

They then claim validity and generalizability based on analysis of citation counts and peer rankings for three additional groups of senior Kurdologists. They say studies with a larger sample are needed.

It will be interesting to see if these results hold up in replications. For faculty and librarians called upon to assist in evaluating research performance, hiring, promotion, and tenure decisions, if normalized citation counts could be used in lieu of peer evaluation, life would be simple. However, these results have shown that citation counts alone may be useful in identifying stars and duds in small research specialities. That could be useful for funding, promotion, and tenure decisions, which are based on performance in a small research speciality. It would not be useful in hiring decisions where one is looking for stars in broad areas, rather than in small specialities. Also, it does not help the many institutions needing to assess the many mid-level performers in the world.

Germain, Carol Anne, Trudi E. Jacobson, and Sue A. Kaczor. A Comparison of the Effectiveness of Presentation Formats for Instruction: Teaching First Year Students. College & Research Libraries. 61(1):65-72, January, 2000.

Motivated by class size and the need for a common learning experience, librarians at the University of Albany developed, tested, and evaluated a web-based instructional module for six hundred first-year students. The web-based module had pages of instruction, followed by pages of questions. If an incorrect answer were given, the student was given guidance and sent back to the question page. The module took fifteen to fifty-five minutes to complete. Web-based instruction was compared to traditional library instruction which took the entire fifty-five minute period. Material covered was the same. A twelve question pre-test was given and the same test was given as a post-test at a second library session ten days to six weeks after the first one. Analysis, using ANOVA, showed there was no significant difference between the two groups in terms of correct answers on the pre-test and correct answers on the post-test. However, the respective alphas were .335 for the former and .053 for the latter. Analysis also showed a significant difference between pre- and post-test scores for both the traditional and web-based groups. Both instructional formats were effective. Librarians decided to use the tutorial on a regular basis. Doing so will save time in the classroom, but the tutorial will require regular updating.

There is no reason to believe web-based tutorials wouldn't also be effective in the health sciences setting. The authors of

this article also showed high school instruction does make a difference Possibly by the time of graduate and professional school, deficiencies in undergraduate library instruction would make an even greater difference in the effectiveness of library instruction, regardless of the format.

Chelton, Mary K. Behavior of Librarians in School and Public Libraries with Adolescents: Implications for Practice and LIS Education. Journal of Education for Library and Information Science. 40(2):99-111, Spring, 1999.

Using ethnographic microanalytic technique, Chelton studies service encounters in middle and high school libraries. Ethnographic method is described as being "the creation of a detailed description of observed behavior from which the meaning of the behavior of the participants could be interpreted." Drawing on the analytic perspectives of Goffman, Lipsky, Mokros, Mullins, and Seracevic, the jargon of which is not easy to understand, she designed a study in which service encounters were examined from the vantage points of professional guides to practice, interviews with adolescents and adult service providers about their perceptions of recalled service encounters, and recorded observations of actual service encounters. Surprisingly, youth services staff were not interviewed about their expectations of ideal service.

Not surprisingly, the three sets of data were not in harmony. Standards are idealized and do not reflect the large proportion of time for enforcement activities. A large proportion of service encounters involved helping with equipment. There is little trust between adolescents and adult service providers.

The idea of comparing standards to actual behavior and user and provider expectations and recollections is sound. However, the theory on which this study is based is not adequately explained, and it seems to be "after the fact' in this study. Examination of the cited works would probably clarify the theoretical basis.

Costello, Richard, Anthony Shaw, Roz Cheetham, and Robert J. Moots. The Use of Electronic Mail in Biomedical Communication. Journal of the American Informatics Association. 7(1):103-105, Jan/Feb, 2000.

All ninety-six authors of articles in the November, 1997, and February, 1998, issues of The Lancet, Journal of the American Medical Association, and the British Medical Journal were asked to keep records of e-mail, if applicable, and conventional correspondence received about the articles they had written. There was an 85% response rate. Fifty-five authors had included e-mail addresses. Eighty-eight percent of the 1181 conventional communications were reprint requests. Seventy percent of 326 e-mail messages referred to the content of the paper. Authors felt that e-mail correspondence was both of a higher standard and more relevant than the conventional correspondence. The authors conclude that "e-mail is a useful and valuable means of communicating with corresponding authors on their research" and that authors should be encouraged to supply e-mail addresses for publication in articles. The Bulletin should also be encouraged to include e-mail addresses routinely.

Richardson, John V., Jr., editor. Millennium Research Agenda Project: Reference Services. Library Quarterly. 70(1):vii-xvii, January, 2000.

In the first of a series of columns on a research agenda for the field, Editor Richardson asked five reference practitioners and researchers what they believe the research agenda for reference service is. He also asked them to comment on what the field needs to advance, if it needs a more sophisticated theoretical or conceptual framework, if they would like to see a consensus on operational definitions of concepts, and what they would like to know that the research literature does not currently cover.

The most interesting question posed by Michael Havener is "Does the use of an intermediary have any measurable impact on the outcome of a search for information?" Although he doesn't say so, the intermediary could behuman or software. The human could be a librarian, a friend, or a non-librarian subject expert. Software intermediaries could be designed by librarians or non-librarians. Comparing the various forms of intermediary seems to be very fundamental to our profession.

Not surprisingly, Martin Dillon, of OCLC, proposes testing two large national systems for answering reference questions.

Matthew Sexton says development of reliable measures to describe the mediation process may or may not be possible. He points to the use of multivariate techniques in psychology, education, and communication and suggests that it could also be useful in our field.

Carolyn Radcliff asks "What difference does reference assistance make in terms of student grades or overall academic achievement?"

Carol Kuhlthau takes the opportunity to advertise her 1993 book, Seeking Meaning, in which she defines five levels of reference service: organizer, locator, identifier, advisor, and collaborator. The first is cataloging, the middle three are traditional reference services, and the collaborator is a more advanced role. The collaborator "will work as a partner in accomplishing tasks requiring extensive information and construction." The librarian knows resources and processes; the user knows content and context. She describes this as "new territory" for many librarians. This concept is well-known to us, as health sciences librarians and is well-entrenched in our literature, at least at the descriptive level. Since we work in an area that has traditionally provided extensive reference services, it is important for us to pay attention to and produce research in the area of reference services.

RESEARCH PROCESS PANEL: Expert Advice for Taking the Pain Out of Research, Part II

APPROPRIATE ANALYSIS: HOW CAN YOU MAKE SENSE OF YOUR DATA?

by Nancy N. Woelfl, Ph.D., Director, McGoogan Library of Medicine, University of Nebraska Medical Center, Omaha, NE

In addition to defining a research question and dealing with three basic methodological questions, all researchers must give careful thought to their statistical methods **before** they begin to collect data. In a practice not unique to libraries, many researchers collect data before thinking about how they plan to analyze it or "shop around" for a statistical test they think give them significant findings. Nothing could be further from good research practice. The null hypothesis, alternative hypothesis, statistical test, sampling distribution, and level of significance should all be specified **before** data collection begins. Appropriate analysis begins at the time of experimental design and involves two key concepts: **levels of measurement** and **data distribution.**

In selecting statistical measures, it is important to understand the **level of measurement** you intend to use. Some data can only be gathered in one form, while others can be gathered a number of different ways. Horse racing furnishes a good example. One can categorize the horses as winners or losers, convert their time scores into ranks such as first, second, or third place, or measure their actual race times in minutes and seconds, Depending on the circumstances, one can make a good case for using any one of these levels of measurement.

There are four different levels of measurement and the level of one's data defines, sometimes even dictates, which statistical methods can and cannot be used to analyze it. The levels of measurement are the nominal level, the ordinal level, the interval level, and the ratio level.

Nominal data describe nonquantifiable characteristics of research variables. These data are sometimes referred to as categoric data because they place data into categories such as male/female, winner/loser, or red/white/blue. Even though nominal data are the simplest form of data that can be gathered, with appropriate design they have considerable statistical power.

Ordinal data represent a variable's position in an ordered ranking and often stand in a "more than / less than" relationship to one another. In the racing example, the first horse has more speed than the second, the second has more speed than the third, but the ranks tell you nothing about how fast the horses actually are. It's important to remember the numbers used to represent ordinal position do not have quantitative value even though some arithmetic operations can be performed on them (i.e., such as the statistical summing of ranks). In many statistical calculations, ordinal ranks function much like categoric variables.

Interval and ratio level data offer high levels of measurement and are statistically powerful. The numeric values that represent **interval** level measurements have true quantitative value and allow arithmetic operations such as addition, subtraction, multiplication, and division. The units of measurement have equal value; they are distributed around or referenced to an arbitrary zero point. **Ratio** level data have all the characteristics of interval data: true quantitative value, arithmetic properties, and units of equal value. There is, however, one important difference: ratio level measures are distributed relative to an absolute zero point. A good example of the difference between the interval and ratio levels is the measurement of temperature. Scientifically, temperature can be measured in degrees Fahrenheit or Celsius. The Fahrenheit scale is an interval level scale that employs an arbitrary zero point - the point at which water freezes. However, even though water freezes at 32 F, heat can still be detected. In contrast, zero degrees on the Celsius scale denotes the total absence of heat.

Whether you measure your variables at the nominal, ordinal, interval or ratio level, the way in which your data are distributed will dictate your choice of statistical test. There are two major categories of statistics: ***parametric*** and ***nonparametric.*** Parametric statistics are designed to be used with normal data distributions. This category of statistics includes the t-test, the F-ratio, and the Pearson correlation coefficient. Nonparametric statistics are designed to be used with nonnormal distributions and includes statistics such as chi square, the Mann-Whitney U test, and Spearman's rho.

Although the following guidelines must be used with care, they can help in deciding which type of statistic to use. In general, you can use a parametric statistic when your data are normally distributed and your sample size is greater than 30. When you don't know the form of your distribution or there is any possibility the data are nonnormal and your sample size is less than 30, a parametric statistic is the

more appropriate choice. Determining whether a distribution is normal or not is a bit more tricky, but it is usually assumed that interval and ratio data follow a normal distribution as long as the sample size is greater than 30. One cannot make the same assumption about nominal or ordinal data with any degree of confidence. With any data set, the larger the sample, the better.

Data analysis is obviously easiest when all data are collected at the same level of measurement. Chi square, Spearman's rho, and Pearson's r are all basically measures of correlation but each is designed to be used with a different form of data. Chi square is designed to be used with nominal data and Spearman's rho with ordinal variables. Both are nonparametric statistics; both assume the underlying data distribution is unknown, i.e., is nonnormal. The Pearson correlation coefficient (r), is a parametric statistic designed to be used when all variables are measured at the interval or ratio level. It requires a normal data distribution.

In real life, even with careful design, it's seldom possible to collect all one's data at a single level of measurement. When mixed data are used, the choice of a statistical measure becomes much more difficult and challenging. The **F-ratio** is based on a statistical technique known as **analysis of variance** and is designed to determine whether there is a significant difference between two or more groups with respect to an independent variable. For example, if an investigator wanted to determine whether the amount of bibliographic training an individual receives has any effect on search effectiveness, he could divide his research subjects into three groups - individuals who receive no training, individuals who receive a single session, or those who receive two or more and then have them do an assigned search for a gold-standard set of articles. In this experiment, the subject groups are best treated as an ordinal variable and the independent variable, articles retrieved, as a ratio level variable. This is precisely the type of situation analysis of variance was designed for and it becomes even more valuable as variables are added to the experimental design. For example, the investigator might also want to look at how long it took each subject retrieve his search results, adding another ratio variable to the research design. When making decisions regarding use of statistics such as the F-ratio, even medical experts with many years' research experience still consult a statistician during the design phase

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regarding possible data measures and the appropriate choice of statistics. Librarians should not hesitate to follow their example.

To illustrate the concepts discussed above, let's return to the research scenario that has been used throughout this series of articles: **Do electronic journals and printed journals serve different information needs?** Statistically, you can answer that question in the following way. Although you could create a variable identifying different user groups (basic scientist / clinician / student), from a design perspective, it's best to control for group affiliation (nominal data) by eliminating this variable altogether. If you are truly interested in exploring differences between basic scientists and practicing physicians, it should be done as a separate experiment. To gather the data needed, you would create a nominal variable defining the literature source consulted (electronic vs. print) and a second nominal variable describing the reason the subject chose that source (for current awareness, to obtain background prior to starting a new research project, to use in a grant proposal, to locate specific laboratory techniques, review findings from other investigators, or other purpose not specified by the person conducting the experiment). By using two nominal variables, you can apply the ***Chi square*** statistic to the data to determine whether there are truly significant differences in use. While this may seem like a relatively simple design, it's really quite powerful because it eliminates variables that are ill suited to the experimental purpose or that have negligible explanatory power. For example, asking subjects how many times they accessed each form of literature would introduce an unneeded variable that added nothing of value to the design.

Many librarians feel they are venturing into uncharted territory when they attempt to use statistics for research purposes. With careful planning and design, with knowledgeable consultation from colleagues and statisticians, most librarians can successfully carry out professional research. The time you invest upfront in thinking about levels of measurement, data collection, and rationalizing your research design are three of the most important investments you will make in guaranteeing the success of your research project.

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