Editorial:

Components of the Research Process: Where Do We Need to Focus Attention?

T oo often, research within library and information science (LIS) has been shaped exclusively by the method of data collection used. Limited attention has been devoted to the various components of the research process, and trying to ensure that they bond together. Based upon more than 20 years of serving in my capacity as a gatekeeper of the literature (journal editor and editor of a monograph series), this article represents random thoughts and encourages readers not to be complacent about the state of published LIS research. It is time to move the literature and discussion of research forward as the profession challenges its researchers and editors to explore new issues and to raise the profession's expectations regarding what comprises *good* research.

Research is an inquiry process that has specific components, the first of which is *reflective inquiry* (problem statement, literature review and theoretical framework, logical structure, objectives, and, as appropriate, research questions and hypotheses). The second component is *procedures,* or research design and method(s) of data collection, and the third component centers on *gathering*, *processing*, and *analyzing data*. The fourth component relates to issues of *reliability and validity* (quantitative study) or *credibility, trustworthiness, transferability, dependability,* and *confirmability* (qualitative study). The fifth component is an extension of the third component: *presentation of research findings*. David R. Krathwohl portrays high quality research as having a "chain of reasoning" that is credible, rational, and conceptual as well as bonded together.[1] He likens the bonding to a chain-linked fence with each component solidly linked to the previous one; there are no weak links in the chain.

In the view of Joanne Martin, research is actually "organized anarchy," as there is no "coherent structure having a

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shared intellectual paradigm common to all disciplines . . . "[2] She might label the components discussed here as an ideal; nonetheless, her characterization does not challenge our expectations of research but it increases the likelihood of encountering error in the research process and in the interpretation of research questions and hypotheses. Clearly, the framework offered by Krathwohl is preferred to the one offered by her. The components outlined here should be understood and accepted as a goal for researchers and gatekeepers to strive to achieve. Focus on these components might result in improving the quality of existing research and in making individuals better problem solvers and critical thinkers. It also does not hurt to become introspective about the research process, thereby ensuring that consumers of social science literature, funding organizations, educators, and researchers themselves have a clearer understanding of that process.

REFLECTIVE INQUIRY

Problem Statement

A problem statement indicates that a study has some uniqueness, has a clear focus, and addresses the value of that research being conducted and, if submitted for publication, being published and read. As David C. Clark, former Dean of the School of Education at Indiana University, Bloomington, explained, the problem statement establishes "the existence of two or more juxtaposed factors which, by their interaction produce an enigmatic or perplexing state, yield an undesirable consequence, or result in a conflict which renders the choice from among available alternatives moot."[3] The problem must also be related "to its general antecedents (i.e., educational, scientific, or social)."[4]

Literature Review

The literature review identifies and describes key works relevant to the problem under investigation. That review also critiques the studies as appropriate and relates them to the proposed research "by assessing their saliency and by showing how both substance and method depend

on them or deviate from them."[5] For example, it is critical to ascertain how related studies have gathered data and whether there are any weaknesses to their data-collection process. By using the information gathered, investigators can make better decisions regarding the procedure portion of their study.

Theoretical Framework

The theoretical framework, an extension of the literature review, ensures that the search for relevant literature is not confined to LIS, that concepts central to the problem under investigation are understood, and that known research (regardless of discipline), as appropriate, is applied. The search for relevant theory and knowledge across disciplines is easier to conduct given the availability of full-text databases (e.g., Elsevier's ScienceDirect) that report research and scholarship broadly. Drawing upon theory enables researchers to provide "patterns for the interpretation of data," link "one study with another," supply "frameworks within which concepts and variables acquire special significance," and "interpret the larger meaning of our findings for ourselves and others."[6] It also enables researchers to align their study within what is known and to increase the cross- and inter-disciplinary value of their investigation. Thus, the theoretical framework conceptualizes, states, and relates the theory relevant to the examination of the proposed problem.

Logical Structure

The structure, although rarely depicted in the final report as a figure or model, should be able to be pieced together. The structure provides the framework in which the problem will be visualized and ultimately investigated. It shows how the components and variables, those examined and those that might have been looked at, fit together logically and conceptually.

The structure, presented as a diagram, focuses on the direction portion of the problem statement as well as laying out briefly other key components. In effect, there is the *theme* portion of the diagram as well as a *who/what* portion, the *how* portion, the *where* portion, and the *when* portion. For example, let us assume that the problem statement focused on the use of academic libraries by college and university students in Boston, Massachusetts. Then, the:

- *Theme* centers on library use;
- *Who* is the students;
- *How* centers on methodology;
- *Where* relates to the colleges and universities in the one city; and
- *When* refers to the time frame for data collection.

For each of these portions, it is possible to identify and relate variables.

Using another example, Figure 1 illustrates how these five portions fit together and the variables associated with each. Either reflective inquiry or the Procedures section deals with each portion.

From the diagram, the investigator can decide which variables to examine and present them in the form of objectives.

Objectives

Study objectives narrow the investigation by selecting the aims of the research activity and, conversely, screening out what the study will not examine. Objectives operationalize those components of the logical structure that the study will explore and provide a framework for the formulation and testing of hypotheses, and the asking of research questions. Any objective has two parts: an action verb and the content of or object of that verb. Referring back to the logical structure, if we look exclusively at the theme or who/what portions, a verb such as "describe," "identify," or "depict" is commonly used. Whenever one portion of the diagram is examined in relationship to another portion, the verb often centers on *relating*: to "compare" or to "contrast." For example, one descriptive objective is "to identify the purpose for which the library is used" and another is "to depict the extent of satisfaction with the library." A comparison objective would be "to compare the extent of satisfaction between undergraduate and graduate students."

Research Questions/Hypotheses

Research questions and hypothesis testing offer direction to the research and the interpretation of the data gathered. They represent a further narrowing of the objectives. Research questions correspond to *descriptive* objectives and hypotheses are associated with *relating* objectives. Hypotheses take relating (comparing or contrasting) objectives and propose a relationship between two or more variables. (Hypothesis testing applies to a sample and inferences from that sample to a population; when researchers conduct a census, hypotheses are inappropriate.) Much LIS research involves description and does not involve any relating.

In a most interesting debate, Jim Lehrer of the PBS nightly news hour program interviewed a unidentified flying object enthusiast and a scientist about whether or not the case about the existence of UFOs at Roswell, New Mexico, could be closed. The enthusiast argued that the issue remained unresolved and he was willing to accept speculation, supposition, and key witness accounts as "truth" or scientific evidence. The scientist, on the other hand, wanted information that would withhold scrutiny in a laboratory setting and be "compelling evidence" that would *prove* the claim—no probability of error. He discounted eyewitness accounts as not always reliable or as "hearsay" unless there could be "independent judgment and real examination," preferably resolvable in a laboratory.[7] A social scientist would be closer to the scientist but would realize that not everything can be resolved within a laboratory, especially when dealing with human behavior. After all, we cannot confine people to such an environment for prolonged periods of time. Thus, a social scientist, through hypothesis testing, would still be dealing with interpretation and a probability of error. Moreover, the social scientist would either support or not support a hypothesis as opposed to proving/disproving or accepting/rejecting it.

PROCEDURES

What steps will be involved in accomplishing the study objectives? The procedures, which refer to the study design
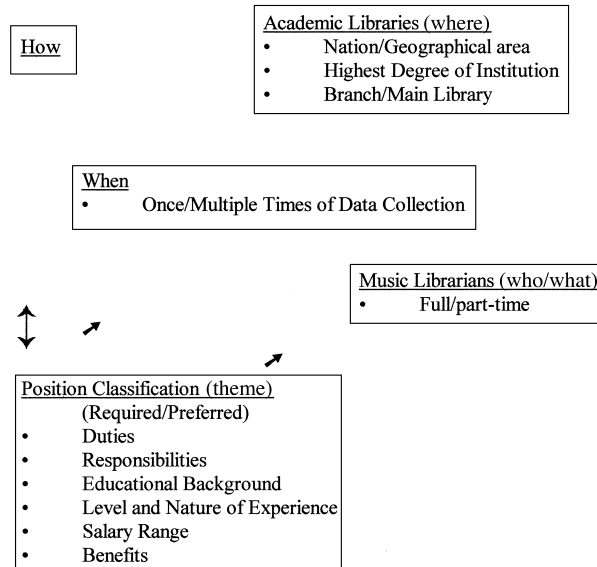
Figure 1
Study Illustration

Study Focus   The investigator has noticed that studies have examined and categorized the content of advertisements for different library positions, but not that of music librarian.

Problem Statement   Studies have categorized the attributes in job advertisements for library directors and systems librarians, but none has examined music librarians in academic libraries and identified their duties, responsibilities, educational background, extent and nature of previous experience, salary ranges, and benefits.

The problem statement justification would have to address:
- What such a study would be important to conduct?
- Why would journals be interested in publishing it?
- Why would readers care to read it?

Logical Structure

How

Academic Libraries (where)
• Nation/Geographical area
• Highest Degree of Institution
• Branch/Main Library

When
• Once/Multiple Times of Data Collection

Music Librarians (who/what)
• Full/part-time

Position Classification (theme)
(Required/Preferred)
• Duties
• Responsibilities
• Educational Background
• Level and Nature of Experience
• Salary Range
• Benefits

Objectives (Examples)   To identify the attributes (requirements, responsibilities, qualifications, and salaries/benefits) of music librarians

To determine the extent to which their responsibilities relate solely to music librarianship

To compare the list of attributes identified in job advertisements by:
- geographical area
- highest degree offered by the institution
- institutional control (private vs. public)

Research Questions (Example)   What are the most frequently mentioned attributes in the job advertisements?

Hypothesis (Example)   There is no statistically significant difference ($p = .05$) between each attribute and geographical region (of the U.S.). Geographical regions, as defined by the U.S. Bureau of the Census, are: Northeast, South, Midwest, and West.

Research Design   What would be the source(s) of the job advertisements? For what period of time? This section answers both questions.

Methodology   How will data be gathered? This section answers that question.

and the methods by which the researchers will study the problem, "are the operational blueprint"[8] that answers the above-mentioned question. The procedures grow out of the reflective inquiry and "deal with the 'how' not the 'what' or 'why' of the research."[9] Too often, novice researchers initially decide to conduct a survey and shape the reflective inquiry and research design to support that decision. Rather, the reflective inquiry guides the selection of a method of data collection.

Research Design

Researchers might use experimental, descriptive, correlational, or other approaches,[10] and they might employ case studies to probe a situation in-depth and to identify variables and propositions that can serve to direct additional research. Research design is an action plan that covers:

- Who/what is studied—the population or a sample? That sample might (or might not) be representative of the population.

- Design considerations. The design might be experimental and address whether certain variables are controlled and whether variables mask other variables.

- The time frame for data collection. Are sampling and repeated measures used?

- Threats to reliability and validity.

Often, researchers have been concerned about external validity and the generalizability of the findings; however, external validity can be superficial in that the generalizations drawn may be too broad to be truly meaningful.

Methods of Data Collection

Methodology, the means by which the researcher collects data, might be self-reports (perceptions or attitudes), policy or historical analyses, and traces or footprints of user/use or staff behavior or performance (e.g., citation analysis, transactional analysis, and obtrusive or unobtrusive testing). Examples of methods are:

- Surveys (mailed, e-mailed, attached to a Web site, distributed in person to users of a library, delivered through in-person interviews, presented through focus groups, or available in different areas for users to pick up and complete if they so choose);

- Content analysis;

- Bibliometrics, including citation analysis;

- Transactional log analysis;

- Obtrusive testing and unobtrusive testing (which is similar to the use of "mystery shoppers" in the retail industry);

- Standardized tests;

- Historical research; and

- Observation.

Each of these methods has inherent strengths and weaknesses. The key is to select and adopt the method that has the most strengths and fewest weaknesses in the context of the problem statement and objectives. For example, a problem with approaching people for participation in an in-house survey is that they may not want strangers to approach them, especially when alone the book stacks. Furthermore, how close can the "stranger" stand when asking for participation and explaining the project? Such issues must be resolved before any data collection.

DATA GATHERING, PROCESSING, AND ANALYSIS

This component refers to data collection, processing, analysis, and interpretation within the context of the study's objectives, research questions, and hypotheses. Research and measurement are susceptible to error. "With some surveys, measurement and classification error may be insignificant, whereas in other instances error might seriously limit the types of conclusions that can be drawn from the dataset." Clearly, errors of measurement and classification are never totally eliminated; nonetheless, researchers try to minimize them and their impact on a study.[11] Total error, which includes both sampling and non-sampling error, can be classified as:

- Coverage errors, which result from inadequate sampling and low response rates;

- Measurement errors, which are due to faulty data collection instruments, poor-quality interviewing, poor respondent recall, response errors, and mistakes in processing (editing, coding, data entry, and data analysis); and

- Sampling error, which is a function of the sample quality—whether a sample exactly represents a population.[12]

Error also results from misrepresentation: falsification and exaggeration. Falsification should not be dismissed as unlikely to occur; there are numerous instances of it, especially in journalism and in research in the physical, medical, and behavioral sciences.[13] Some other possible sources of error include evaluator or sponsorship bias or faulty interpretation by the investigator.

If statistical tests are used, they must be appropriate and correctly interpreted. One problem with some research studies is that investigators let computer printout dictate the interpretation of statistical significance or that statistical significance may be concluded but without the use of hypotheses or of statistics.

QUALITY/GENERALIZABILITY ISSUES

Quantitative Study

Reliability and validity are concepts of measurement. Reliability deals with the consistency of the data; consistency is the extent to which the same results are produced from different samples of the same population. Reliability means freedom from random error; if a measure repeatedly produces the same response, it is considered reliable. As random error decreases, reliability increases. Error is introduced, for instance, through questions that are ambiguous, open to varied interpretation, or lack definitions when uncommon terms are used, or through sloppy data entry (e.g., inconsistent coding).

A question or a data collection instrument is valid to the extent that it measures what it is supposed to measure. Validity centers on removing systematic influences that move responses in another direction. When such an influence is present, the measure is biased. Bias might result through:

- Poor sampling—sample not reflective of a known population;
- Faulty wording of a question—the wording evokes a particular response;
- Sloppy administration of data collection instrument—investigators bias responses; and
- Inappropriate interpretation of the results—investigators assert their perspective into the interpretation of findings.

There are four types of validity: *content*, *construct*, *criterion*, and *convergent* validity. Content validity is concerned with the representativeness of the measuring instrument in describing the content that it is intended to measure. The central question is "How well does the content of the instrument represent the entire universe of content which might be measured?"[14] Face validity, which represents the investigator's appraisal that the content reflects what he or she is attempting to measure, comprises a form of content validity. Face validity is also judgmental and subject to interpretation.

Construct validity examines whether or not the theoretical construct or trait is actually measured. For example, does a study actually measure leadership, customer loyalty, or library anxiety? Criterion validity compares scores on the data collection instrument to certain criteria known or commonly believed to measure the attribute under study. The purpose is to determine the extent to which the instrument treats a criterion. Any criterion must display *relevance* (represents successful performance on the behavior in question), *reliability* (a consistent measure of the attribute over time or from situation to situation), and the *absence of bias* (the scoring of a criterion measure should not be influenced by any factors other than actual performance on the criterion). A problem in the application of criterion validity is that many types of behavior cannot be converted into an appropriate criterion.

There are two forms of criterion validity: *predictive* and *diagnostic*. The purpose of the former is to estimate or predict a future outcome, whereas the latter form diagnoses the existing or current state of a subject. The central difference between the two relates to the time when the data depicting the criterion are collected. To qualify as predictive validity, the correlation is between the test scores and observations of future behavior. Diagnostic validity requires that the correlation not be delayed, but be made at approximately the same time.

Convergent validity is related to concurrent validity, which focuses on how accurately a question reflects real concurrent differences or is correlated with known values of the underlying construct. A question possesses convergent validity if it displays scores similar to other questions measuring the same underlying construct.

A different type of validity is external validity, or the extent to which findings can be generalized from a sample to a population. LIS researchers often focus on external validity, and not on the other types of validity.[15] Both concepts do not go hand in hand with *utility*. For example, we could develop a course evaluation form in which the questions are clearly worded and conform to face validity. However, if the faculty and students do not agree on which questions have the greatest utility and best reflect the content, criteria, and constructs they regard as most important to ascertain, the instrument has little value; other problems with internal validity may be present. As the brief example illustrates, decisions about validity may be made within a political context.

Qualitative Study

Qualitative research "tends to apply to a more holistic and natural approach to the resolution of a problem than does quantitative research. It also tends to give more attention to the subjective aspects of human experience and behavior."[16]

PRESENTATION OF FINDINGS

This component is often omitted or slighted, when, in fact, it is quite important. Researchers must be good communicators, both orally and in writing, otherwise readers might gain erroneous impressions about the quality of the research and how well each component was executed. Ronald R. Powell offers some good insights for the investigator evaluating the quality and presentation of a research study before submission to a funding source or a scholarly publication.[17] As discussed elsewhere, many manuscripts reviewed for possible publication are not well written.[18] Authors commonly make extensive use of passive voice; nouns and verbs do not agree; there is often repetition of the same word in a paragraph; use of the wrong word (e.g., it's for its); awkward sentences, trite expressions, typos and misspellings; and so on. A manuscript may not conform to the style pattern used by the journal, which may make editor and reviewers think that the paper has been rejected by another editor (at least it requires significant revision before it can be accepted).

Some basic points to consider are:

- Place the problem statement up front so that the reader knows what direction the research will take;
- Have opening and closing paragraphs that invite readers;
- Present the components of the research process clearly and fully, and ensure a strong bond between them;
- Cite key literature and do so accurately;
- Acknowledge any (and all) intellectual debts;
- Fully explain study procedures;
- Separate findings from interpretation or discussion; and
- Use statistical procedures to support statements of significance.

Finally, remember the eight reasons why LIS editors are likely to reject manuscripts:

- Findings are not generalizable;
- Failure to address the "so what" question in the problem statement;
- Poor writing;
- Inadequate scholarship;
- Weak statistical methods;
- Wrong choice of journal;
- Paper offers little new material or insights; and
- Bad luck.[19]

The last category recognized, for instance, that an editor might have received multiple papers on the same topic. Clearly, "a missing or weak element might make the differ-

ence between the opportunity to revise the paper and rejection."[20]

SOME CRITICAL ISSUES TO ADDRESS

A Known Population

Much research focuses on a knowable population. For instance, once we determine the number of students in an academic program or the number of faculty at an institution, we can select a representative sample. However, libraries offering services on the World Wide Web may be willing to serve anyone who ever visits the site, or scholars worldwide. In such instances, the population cannot always be determined. How might an appropriate sample be drawn? Clearly, there is need for discussions of research designs that keep pace with changing circumstances.

Cluster Sampling

Cluster sampling has not been one of the more frequently used methods of probability sampling in LIS. With the widespread availability of electronic datasets that are geo-coded (by longitude and latitude), marketing researchers and pollsters can select their sample with specific attributes of the population in mind. For example, for a given ZIP code, census tract, telephone exchange, voting district, and so forth, it is possible to query relational databases by the telephone number, social security number, or address of a housing unit and to select representative households. If a public library has an internal database that it can combine with a geographic information system (GIS) system, it can draw a sample of households in which one or more members have a library card. Assuming no violations of privacy occur, that information could be combined with information in other databases (through relational databases or by geo-coding other datasets). Based on the specific characteristics desired by researcher, a probability sample could be taken and more precise insights drawn about library use or non-use—or, in the case of marketing studies, about the purchase patterns of the public.

The state of Massachusetts is considering legislation on privacy that regulates the extent to which companies must obtain the consent of consumers before sharing or selling any type of personal information with outside parties. Must they obtain consent before sharing the information (opt-in approach) or must consumers ask to be removed from any information sharing (opt-out theory)? In the debate, Lt. Governor Jane Swift said "I'm not sure I care if everyone who wants to sell me potato chips figures out what kind I buy during certain times of the year."[21] Some of us, however, might care, especially if more is revealed about purchase patterns, browsing, and use patterns (through the attachment of persistent cookies to our computer), and us in general.

Cluster sampling ultimately might afford the opportunity, when combined with information on actual purchase and viewing patterns, to learn perhaps too much about individuals. Clearly, there is a dark side to the use of cluster sampling and, with proper sensitivity to privacy, cluster sampling might merit more attention, especially as the cost of databases decreases and more information becomes available. Researchers should explore this type of sampling with caution, while universities, professional associations, and societies should adopt ethical guidelines and encourage na-

tional governments, in those countries lacking strong privacy legislation, to deal more thoroughly with privacy.

Qualitative Versus Quantitative Research

For too long, writings on research methods in LIS have tended to emphasize the "versus" and to argue for more qualitative research at the expense of conducting quantitative research. Such writings have tended not to view the discussion within the context of the problem statement and the objectives. More research should involve the use of triangulation, or multiple methods, some of which are quantitative and others are qualitative. Each has a place and this fact must be better understood.

Outcomes Assessment

Within higher education in the United States, accrediting bodies call for academic institutions—academic programs, departments, and libraries—to engage in outcomes assessment that monitors student learning from student enrollment in a program to completion of required courses and to graduation. In the case of libraries, what outcomes complement those used by academic departments and programs? For example, what should students master (and how well have they done so) in the areas of information literacy and the use of technology?

Once educators and librarians embrace outcomes assessment, they may need experimental designs and hypotheses to guide their assessment. Any procedures that are recommended must be simple and straightforward so that others not well versed in evaluation can adopt and understand them, as well as interpret the results correctly. Compounding the problem, little of the research in LIS has focused on experimental research and longitudinal studies consisting of a series of periodic observations extending over the duration of a student's program of study. Outcomes assessment, however, will force attention on such research and on hypothesis testing, and more practitioners need to acquire a better understanding of more complex research designs—where variables may mask other variables, thereby increasing the chance of error or bias in a study.

At the same time, we need more studies of LIS education and the place of research methods' courses in such programs. How are such courses reinforced throughout the curriculum, and what place does research methods have in continuing education offerings?

Response Rates

My impression is that, in the last several years, response rates to survey research have fallen. It seems more common for studies to have rates well below 50%, perhaps in the range of 20 to 40%. The investigators may not have analyzed whether or not those responding differ from those who respond. Let me insert an example for illustrative purposes. Assume that we accept (for purposes of this illustration) the term *customers*. A library's users then become the customers. The population of the community served by the library also includes *never-gained* customers (e.g., ones who are about to start college or who recently moved to the community), *lost* customers (ones who no longer use a library perhaps due to a bad experience), and *non*-customers (those who would not use the library under any conditions). If we sent (via mail or e-mail) a survey to the population, would

Figure 2
Some Topics Meriting Investigation

The attributes that library directors of the future will need to possess and how they can effectively gain those attributes. What is the role of library education, professional associations/societies, and professional groups in providing them?

Changing scholarly communication within an electronic environment and the degree of acceptance of electronic publishing in promotion and tenure decisions.

Scholarly communication—selection of items from full-text electronic databases (information overload and process of filtering out sources). Is full-text retrieval breaking down disciplinary boundaries? If so, how do scholars (and others) evaluate the articles, etc. they discover, and how do they select the ones they use? How do (will) services such as netLibrary fit into scholarly communication? What do scholars read or save in electronic form and what do they print?

Use of digital libraries by scholars, students, and educators (longitudinal studies). Are there differences by discipline?

What resources do students enrolled in distance courses delivered through the Web use? Where do they obtain these resources?

How do we access *outcomes*, and which outcome measures apply to library services?

How widely is fund-raising becoming an activity that academic library directors engage in?

How people gather information in an electronic environment and their use of libraries in a competitive environment. User *satisfaction* with the libraries and library services

The interrelationship and difference between service quality and satisfaction

The utility of (and interrelationships among) library measures (performance, customer-related, outcome, and input)

Role of pre-publication sources for social scientists and scientists as a filtering device

Effective ways to improve the accuracy of answers that reference staff provide to questions requiring the use of print and electronic resources

Impact of electronic government on the citizenry of a democratic nation

Use of government information by the public (including senior citizens, students, faculty, scholars, and so on) in work and non-work information-seeking situations. Use of electronic government and the array of services provided. The impact of a government's presence on the Web with a depository library program in that country; is in-house library use declining and use of government Web sites increasing?

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not the actual customers be most likely to respond? In fact, might not responses be skewed in their favor? Why would the other segments of the population be likely to respond? Furthermore, customers comprise those ranging from infrequent to heavy users. Will our respondents sufficiently reflect all of these customer/non-customer variations?

How can we improve response rates? How do we guard against self-selected samples? Both questions merit analysis. Furthermore, with everyone flooded with requests to participate in surveys and more people becoming resistant, how do we get more people to accept the imposition and participate? Part of the answer may depend on how librarians see the findings benefitting their situation and leading to service improvements.

Research on Methodologies

There is need for research that assesses methodologies, such as done in sociology and public opinion polling, and on ways to strengthen the advantages and lessen the disadvantages of any methodology.

Problem Statements

Many studies published in LIS do not contain a problem statement or confuse such a statement with a statement of purpose. LIS, however, is not alone in needing to achieve a consensus of what comprises a *problem*.[22] It would seem that a problem statement consists of four components:

- A lead-in that provides the content for what follows;

- A declaration of originality that the literature review supports;

- A statement of direction that clearly shows what the study will examine (here might be the purpose statement or general questions); and

- An explicit and well-developed justification of the study's significance or value.

Literature Reviews

Numerous studies have shown that LIS, like other disciplines, contain substantial errors in citations (e.g., typographical errors in the author's, editor's, or journal's name; incorrect volume, year, or page numbers) or in quotations from published studies.[23] Is the problem as bad today as it was in the past? Do LIS journals still have a high error rate, or, if they do, what can they realistically do to lessen the problem?

SOME OTHER IMPORTANT RESEARCH TOPICS

Numerous research agendas have been developed and presented to the profession, trying to encourage research on new topics, ones important to advance LIS as a discipline and to aid librarians in managing libraries and services.[24] In an excellent paper, Alison I. Piper "discusses the application of methodological techniques to social science Web experiments and suggests topics in library and information science most conducive to research on the Web."[25] Figure 2 extends such writings by offering an additional list of some topics meriting investigation.

In *Why We Buy*,[26] Paco Underhill views shopping and purchasing as a science in which shopper behavior can be predicted and merchandise laid out in such a way as to produce higher sales. He chastises social scientists for their overuse of surveys and too frequent reliance on self-reporting, and he notes the fallibility of self-reporting. As an alternative, he videotapes shoppers and tracks their movement within stores for Fortune 500 companies. Some of his recommendations merit investigation within service organizations such as libraries. For instance, he identifies a *transition zone*, the entryway to a building in which one adjusts to the environment. Libraries have such a zone. What can they place there successfully? Furthermore, while people wait in lines and are not talking with a companion, should libraries place material for them to browse? If so, what will capture their attention?

CONCLUSION

A decade ago, Nancy A. Van House observed that "much of the research in LIS is episodic. Rarely do researchers build a continuing series of projects so that their own work is a coherent whole. Nor do they often build on one another's work. Fragmentation of research efforts reduces the overall impact of the work that is done."[27] With few exceptions,[28] the situation remains but, it is hoped, will change in this new century.

Van House issues an important challenge: "LIS research needs less inward examination and more outward linkages, both to learn from other fields and to communicate to them the value of LIS and the importance of the questions to be addressed in this growing age of information."[29] Such linkages now occur but we need more of them between LIS and other disciplines and scholars and policymakers, for instance, interested in public policy, including government information policy.

We must all raise our expectations and challenge the profession to value and use research. At the same, a wider array of funding organizations must support LIS research, and journal editors must be held to a higher standard than many of them currently seem to follow.

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18. See "Common Writing Deficiencies in Manuscripts for Publication," in Peter Hernon, Hae-Young Rieh Hwang, Barbara D. Farah, Andrew J. Golub, Pat K. Bryant, Li-Ling Kuo, & Maya De, *Statistics for Library Decision Making* (Norwood, NJ: Ablex, 1989), p. 161.
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26. Paco Underhill, *Why We Buy: The Science of Shopping* (New York: Touchstone, 1999).

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28. An example of one exception is service quality; see Danuta A. Nitecki & Peter Hernon, "Measuring Service Quality at Yale University Library," *Journal of Academic Librarianship* 26 (July 2000): 259–273.

29. Van House, "Assessing the Quantity, Quality, and Impact of LIS Research," p. 98.