Recent Trends in Research: A Methodological Essay

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The first national library research seminar, held at Florida State University in 1996, provided the impetus for this consideration of relatively new and uncommon research methods being employed by researchers in the social sciences and in library and information science in particular. This article begins with a review of the various research methods that researchers in library and information science have used. The focus then shifts to an identification of methods appearing in the qualitative research literature. They include phenomenological methods, hermeneutics, ethnomethodology, reflexivity, discourse analysis, and semiotics. Methods more, if not exclusively, quantitative in nature are next examined and include discrete choice analysis, log analysis, protocol analysis, and geographic information systems. (A geographic information system can be viewed as an information service or a management information system, but it is considered here because of its applications as a research method.) Brief consideration is given to possible future methodological trends in social science research. An extensive bibliography is provided.

Library Research Seminar I, the first national library research program, was held at the School of Library and Information Studies, Florida State University, Tallahassee, November 1-2, 1996. The major goals of the seminar were to:

- Facilitate the development of research-based knowledge for the library and information science professional;
- Explore interdisciplinary perspectives and new methodological approaches; and
- Encourage collaborative research by practicing professionals and educators.

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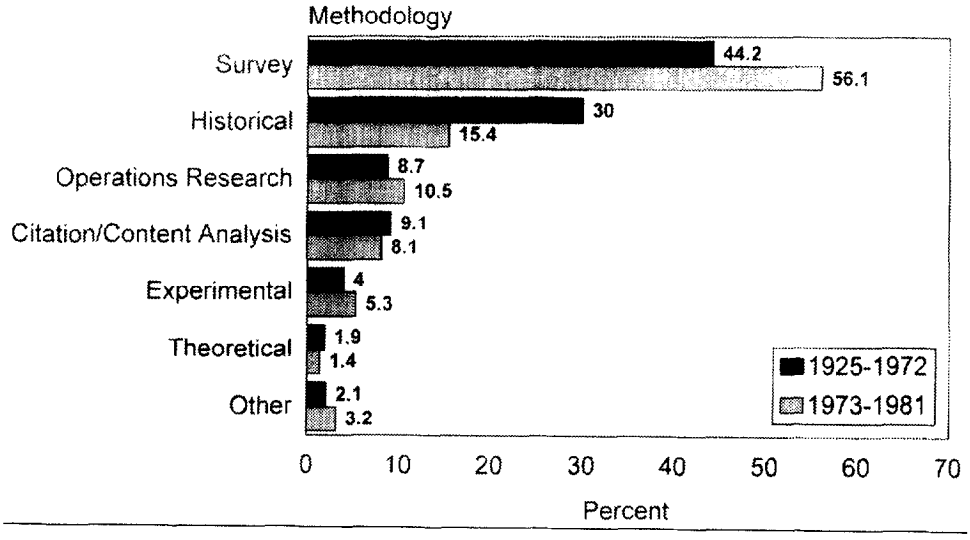
In response to the call for papers for the seminar, 83 abstracts were submitted. As one who reviewed the abstracts and attended the conference, the author of this paper was struck by the number and diversity of research methods, as well as topics, represented by the submissions. A number of the methods employed by presenters were multidisciplinary in nature, and some researchers had used more than one method. Specific methods ranged from historical analysis to World Wide Web (Web) log analysis. The seminar was deemed so successful that the American Library Association's Library Research Round Table created a task force that is making plans for Library Research Seminar II.

Other evidence of strong interest in the methodological nature of library and information science (LIS) research includes a methodology paper competition announced by the Association for Library and Information Science Education (ALISE) in 1997. The competition is open to all types of methodology and was created to stimulate the communication of research methodology at ALISE annual meetings.

In December 1996, a "CRISTAL-ED" discussion on the Internet, sponsored by the University of Michigan's School of Information and moderated by Robert Holley, considered "varying research cultures." Some of the questions posed by Holley were:

- What effect does prior training in various research methodologies have on library and information science?
- Does library and information science have a generally accepted research norm?

FIGURE 1
Dissertations and Research Methodologies



- Regarding its research methodologies, is library and information science basically a social science?
- How will the emergence of "information studies" affect research methodology?
- How do geography and time affect research methodologies?

The discussion also addressed issues such as the interdisciplinarity of library and information science and the importance of theory and applicability.

In preparation for this article, the author reviewed the research literature of the social sciences, including library and information science (LIS), published during the past several years. What follows is a consideration of research methods thus identified and deemed to be relevant to library and information science research. Not all of the methods are new; some of the qualitative methods in particular have been in use for a number of years. But they do represent relatively recent research trends in the social sciences and, in several cases, are virtually nonexistent in the LIS research literature. The review emphasized research methods, rather than data analysis techniques, but a few of the latter are included where they are as much a method as they are a statistical procedure. A detailed analysis of bibliometric and historical methods was considered to be basically outside the scope of this article.

TABLE 1
Research Methods in Library/Information Science Dissertations 1985-1989

	Information Science		*Library Science*		*Total*	
Method	*#*	*%*	*#*	*%*	*#*	*%*
Descriptive	1	0.5	5	1.6	6	1.1
Case Study	6	2.8	13	4.1	19	3.6
Bibliographic	0	0.0	4	1.2	4	0.7
Historical/ Biographical	5	2.3	28	8.9	33	6.3
Survey (Questionnaires, Interviews)	40	19.0	163	52.2	203	38.8
Bibliometric (Including citation studies)	21	10.0	15	4.8	36	6.8
Content Analysis	1	0.5	6	1.9	7	1.3
Modeling	28	13.3	3	0.9	31	5.9
Quasi-Experimental	5	2.3	5	1.6	10	1.9
Experimental	42	20.0	19	6.0	61	11.6
Theory	7	3.3	1	0.3	8	1.5
Combinations	3	1.4	4	1.2	7	1.3
Other	25	11.9	29	9.2	54	10.3
Not Adequately Described	26	12.3	17	5.4	43	8.2
Total	210	99.6	312	99.3	522	99.3

REVIEWS OF RESEARCH METHODS

Comprehensive Reviews

As noted by Powell (1995), there have been several analyses of the research methods employed in LIS. The following presentation of those analyses employs the respective authors' classification schemes for categorizing the research methods; there is no one agreed upon scheme. Schlachter and Thomison (1982), for example, produced a breakdown of dissertations by methodology for the years 1925 - 1972 and 1973 - 1981 (see Figure 1). As Schlachter and Thomison noted, the rankings by methodology for the two time periods remained about the same, the historical studies decreased by half, and the survey studies increased from 44 % to 56 %.

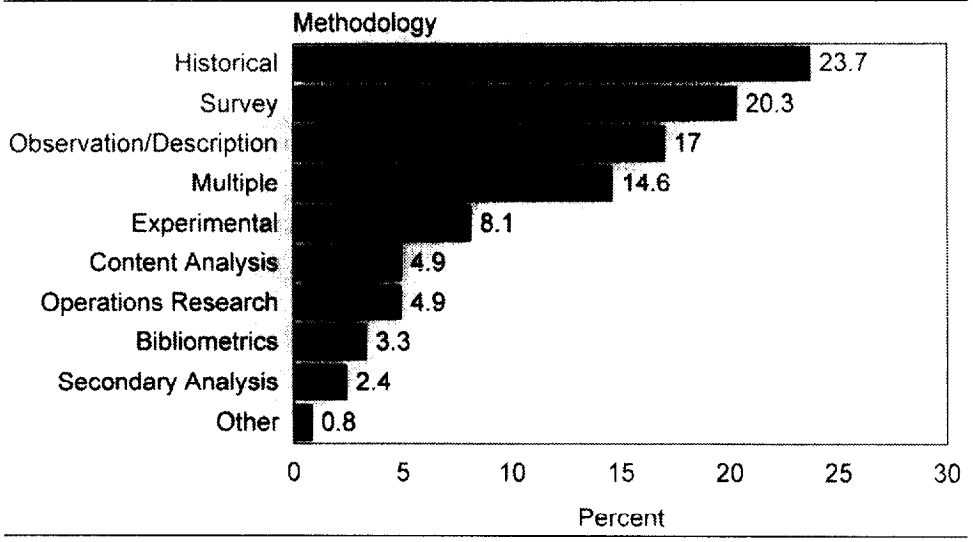
In an analysis of methods used in LIS dissertations for 1975 - 1989, Blake (1994) used a scheme of 12 categories (see Table 1 for a breakdown of the dissertations by methodology for the most recent period that he considered). He found that survey and historical / biographical methods were the two most popular methods and were used in about 60% of the library science dissertations completed in each of the three time periods that he investigated. But he also concluded that experi-

TABLE 2
Research Papers by Methodology and Year

Methodology	*1950*	*1960*	*1965*	*1970*	*1975*	*Total**	*%**
Theoretical-analytical	11	17	11	36	52	127	14
Information system design	7	16	21	57	49	150	17
Surveys on the public	3	2	9	20	19	53	6
Survey or experiments on libraries, etc.	22	15	45	89	113	284	32
Bibliometric and similar studies	0	1	7	14	16	38	4
Content analysis	0	1	2	1	3	7	1
Secondary analysis	6	15	15	13	27	76	8
Historical methodologies	21	26	25	49	42	163	18
Descriptive bibliography	7	4	6	4	9	30	3
Comparative studies	0	2	6	4	7	19	2
Other and multiple	3	1	7	9	10	30	3
All papers*	76	96	139	274	315	900	100

Note: *The figures add to more than the total number of papers (and the percentages add to more than 100), since a paper may have more than one methodology.

FIGURE 2
Research Methods of Articles Published in 1984



mental and modeling methods were being used in more LIS dissertations than in the past. Blake's study did not find a move toward greater use of qualitative methods; indeed, he found the opposite to be true. In 1993, however, Fidel reported that at least 16 dissertations with qualitative components had been completed since 1986. Of the 34 dissertations reported to be in progress as of June 1998, 14 were based on quantitative designs, 14 on qualitative ones, and 6 represented the use of mixed methods (Kim, 1998, p. 343).

Peritz's (1980-81) analysis of the methodologies used in research papers published in selected years from 1950 - 1975 is summarized in Table 2. Peritz observed that bibliometric studies were a relatively small group, content analysis was rare in LIS research, and theoretical studies increased dramatically after 1965. Surveys continued to be the most popular type of study.

Feehan, Gragg, and Havener (1987) examined the LIS research articles published during 1984 and produced the ranking shown in Figure 2. Once again survey research methods (including observation / description) and historical methods were the most common. It is noteworthy, however, that 14.6% of the articles represented more than one research method.

In 1996, the "Research Record" column of the *Journal of Education for Library and Information Science* (Kim, 1996, pp. 378-380) presented a relatively comprehensive listing of "research strategies, including data collection and analysis techniques," based on a synthesis of various classification schemes used in previous analyses of research methods and research literature. The research methods section of that column follows:

- *Theoretical/philosophical inquiry*—development of conceptual models or frameworks through reflection and logical analysis; includes meta-analyses and literature reviews.
- *Bibliographic research*—descriptive bibliographic studies that examine books, their physical properties, publications, printing, variant editions, etc.; also includes systematic, enumerative bibliographies such as subject and author bibliographies/bio-bibliographies.
- *R&D [Research and Development]*— development of information storage and retrieval systems; software, interface, and prototype design, development, and evaluation; may employ combinations of quantitative and qualitative strategies listed below.
- *Action research*—applied research strategy that collects information to solve problems and to bring about change in specific settings or organizations; organizational participants typically involved in studying their own problems and taking steps to bring about change; typically employs combination of quantitative and qualitative strategies listed below.

Quantitatively Driven Strategies

- *Descriptive studies*—survey or observational studies generally designed to describe current status of phenomenon in terms of specific set of variables or conditions; not designed to test hypothesized relationships between variables.
- *Predictive/explanatory studies*—non-experimental studies designed to test for hypothesized relationships among variables for purposes of explanation or predication; may include survey, ex post facto, causal-comparative designs.
- *Experimental studies*—true, quasi, and pre-experimental studies conducted in controlled lab or field settings.
- *Bibliometric studies*—includes citation analysis; studies of literature scatter, growth, obsolescence; author or institutional productivity, patterns of authorship and institutional affiliation, etc.
- *Content analysis*—objective, quantitative studies of documents or other forms of communication that examine frequency/patterns of words, phrases, concepts, images, themes, characters, roles, etc.; includes readability research.
- *Operations research studies*—employing management science, system analysis, and mathematical modeling techniques to support managerial decision making.

Qualitatively Driven Strategies

- *Case study*—in-depth, detailed study of one subject, that subject being one person, one specific group composed of many people, or one organization

composed of many subgroups; as strategy, defined by focus on specific single case and not wide range of qualitative strategies likely to be employed (case studies of more descriptive, less interpretive nature included here).

- *Biographical method*—studies that report and document life history and stories of person(s) from birth to present or for particular segment of time; may be undertaken from disciplinary perspectives of literature, history, or social sciences, latter using life stories and personal narrative accounts to generate more abstract conceptualizations, taxonomies, explanations, and interpretations of behaviors and events from cultural, sociological, or psychological perspectives (biographical studies of more descriptive, less interpretive nature included here).
- *Historical method*—studies that seek to describe and understand past events and human experiences through collection, evaluation, analysis, and interpretations of historical data; strategy to reconstruct historical reality formed by intentions and behaviors of specific persons in time and space (historical studies of more descriptive, less interpretive nature included here).
- *Grounded theory*—studies that seek to inductively and systematically develop taxonomies and theories through intensive analysis and coding of descriptive data collected about phenomenon under investigation; theories emerge through iterative, constant comparison of concepts and categories against data and said to be grounded in given naturalistic setting being investigated.
- *Ethnography*—studies dealing with cultural description based on researcher's participation in daily life of defined cultural group over extended period of time; describes culture as shared knowledge and commonsense understanding of members of group that determine appropriate behavior in that cultural setting.
- *Phenomenology, ethnomethodology, and other interpretive practices*—family of interpretive strategies that investigate those everyday actions, practices and procedures by which individuals give meaning to and make sense of daily life experiences; requires researcher to bracket or set aside any preconceptions on essence or nature of objects and events and to become immersed in individuals' life world in order to understand how they subjectively constitute and interpret reality; concentration of phenomenology on life world; of ethnomethodology on social world.
- *Symbolic interactionism/semiotics*—another interpretive strategy that investigates how individuals create, interpret, and modify meaning of things in their environments through their social interactions; studies signs and significant symbols of meaning produced and interpreted in these interactions or communications (semiotics).
- *Sociolinguistics, discourse analysis, ethnographic semantics, ethnography of communication*—strategies that seek to understand form, process, structure, and rules of conversations as well as social and cultural context in which these conversations occur.

- *Hermeneutics, interpretive interactionism*—blending of strategies of phenomenology and symbolic interaction to understand meaning of complex social interactions from perspective of daily life experiences and to use this interpretation to understand social, political, cultural, economic, historical context that frames this experience; involves circular interpretive process in which researcher moves back and forth between immersed observation, understanding, and interpretation, recording notes and writing narrative accounts of this interpretation, and continued observation, each subsequent interpretation helping to more fully understand what is observed in next encounter; requires questioning attitude and ongoing dialogue/interaction with individuals, peers, and self.

As Kim noted, this listing includes more qualitative methods categories than do previous schemes.

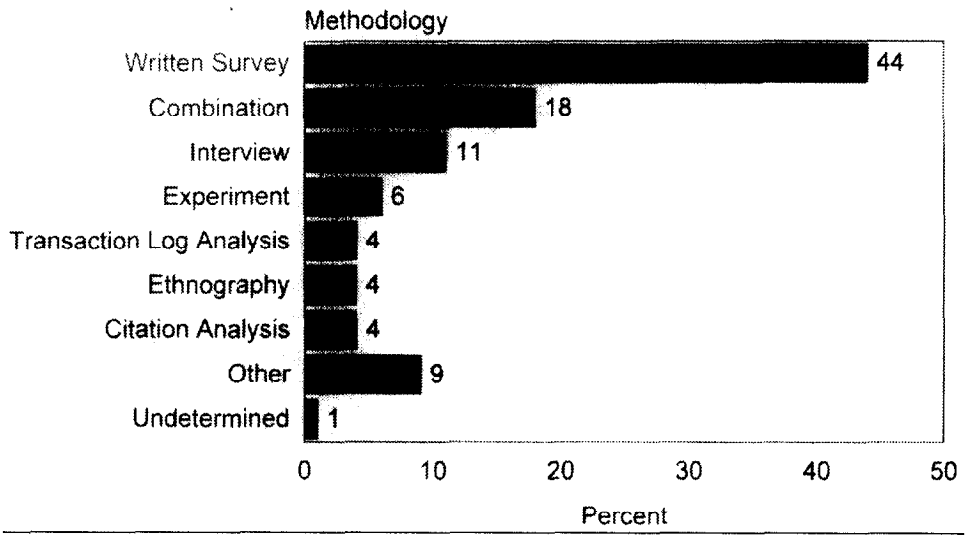
Area Specific Reviews

There have been some more focused examinations of the LIS research literature as well. In a recent review of public library research activity in England, for example, Goodall (1996) was impressed by the variety of research topics being examined but was concerned about "the paucity of research methods" employed. She reported 13 methods (see Table 3) as having been mentioned in 44 research articles published in the *Public Library Journal* from 1986 to 1995 and noted "the reliance on a handful of standard methods" (p. 75). Goodall concluded by calling for "an enrichment of methods [that] would enable public librarians to answer previously unresolved questions" (p. 75).

TABLE 3
Methods Mentioned in 44 Research Articles

Method	*Frequency*
Postal / Self-completion questionnaires	18
Structured interviews using questionnaires	10
Literature review / desk research	7
Case studies	5
Interviews	4
Desk research / statistical analysis	4
Set up experimental service	4
Observation	4
Focus groups / discussion groups	3
Consultation with experts	2
Unobtrusive testing	2
Computer simulation / modeling	2
Workshops	1
Telephone survey	1

FIGURE 3
Research Methods in Information Needs and Uses Studies, 1990-1994



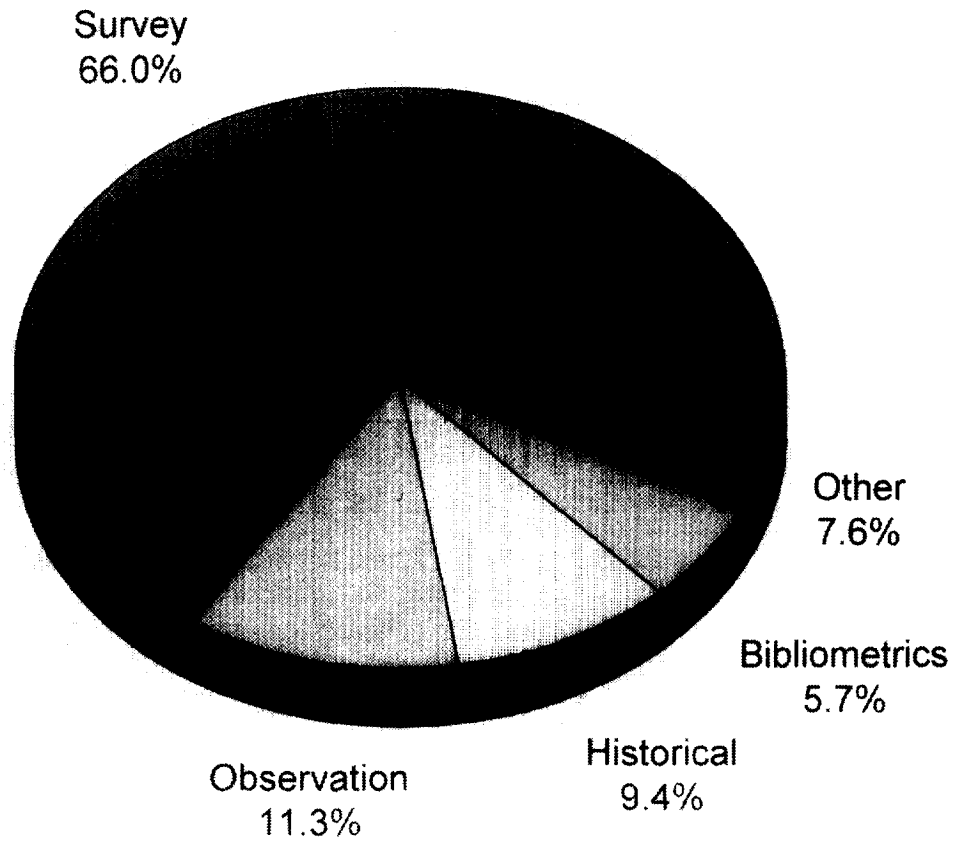
In a content analysis of the information needs and uses literature of 1990 - 1994, Julien (1996) found "that written questionnaires and interviews (survey methods) accounted for 56% of research methodologies employed in research studies" (p. 58) (see Figure 3). Julien's analysis of the research literature, as did Goodall's, found a continuing, heavy reliance on traditional survey methods. She also found that only 28% of the research studies were theoretical or theoretically grounded.

Dimitroff (1995) conducted a content analysis of the literature of special librarianship to determine, among other facts, the research methods used by authors. Her analysis of 277 articles about special librarianship published in 1993 and 1994 revealed, once again, that "survey research was the predominant methodology" (p. 262), representing 66% of the articles. Dimitroff's breakdown of research methods and percentages are reported in Figure 4. Dimitroff's (1992) earlier examination of the health sciences librarianship literature produced similar results and she concluded that "both areas utilize less sophisticated methods than LIS research in general" (1995, p. 263).

In what was mostly a topical review of the research in technical services published from 1988 - 1991, Simpson (1992) found that "two-thirds of the research represents field studies and one-fifth represents survey research, with the rest comprising experiments, methodologies, and models" (p. 403). Simpson also found evidence of cost studies and case studies.

Callison (1997) reported an analysis of methods used for dissertations related to school library media for 1980 to 1995 and compared Ph.D. and Ed.D. dissertations (see Table 4). "His analysis showed a dramatic increase in the use of the case study method, as well as a substantial increase in the number of dissertations based on experimental methods" (1997, p. 349). He also noted that content analysis greatly increased, while the use of historical methods, citation analysis, and survey ques-

FIGURE 4
Research Methods in the Special Library Literature, 1993 and 1994



tionnaires declined. Both of the preceding lists reflect the growing interest in qualitative and interdisciplinary research. As evidenced by a review of bulletins and other program descriptions (Powell, 1995), the latter trend is further supported by some of the current approaches in LIS doctoral programs.

TABLE 4
Comparison of Research Methods in Ph.D. to Ed.D. Dissertations Related to School Library Media, 1980-1995 (Reported in Percentages)

Method	*Ph.D. 1980-88 n = 80*	*Ed.D. 1980-88 n = 88*	*Ph.D. 1989-95 n = 73*	*Ed.D. 1989-95 n = 40*
Survey Questionnaire	63	81	39	41
Interview	05	03	04	10
Citation Analysis	09	02	01	00
Content Analysis	00	02	15	15
Case Study	03	00	23	13
Historical	12	05	03	02
Experimental	09	07	14	19

What follows is a closer look at several research methods that have been used in recent years by researchers in the social and behavioral sciences. Some of the methods, such as the case study, are rather common; others are relatively new and uncommon, especially in the LIS research literature. In the analysis of methods that follows, a brief description will be provided, one or more examples of studies using the method cited, and the method's potential for LIS research discussed.

QUALITATIVE RESEARCH METHODS

Qualitative research methods are clearly enjoying an increased popularity. According to Tierney and Lincoln (1994), interest in qualitative methods and interpretive, hermeneutic, and constructionist approaches has never been higher. As a result of her review of the literature, Fidel (1993) concluded that the use of qualitative methods in information retrieval research was on the rise. She noted that two books and two issues of scholarly journals about qualitative research had been recently published, numerous doctoral dissertations had been based on qualitative inquiry, sessions of professional conferences had addressed qualitative research, and an increasing number of research studies had qualitative components. And the growing number of LIS publications concerned with qualitative research is a trend that continues. We are seeing more how-to type publications as well. Westbrook's (1997) overview of qualitative research methods is a useful, succinct introduction to the topic. A book-length introduction to qualitative research aimed at the information professional can be found in Gorman and Clayton (1997). Earlier works on qualitative research from a librarianship perspective include books by Mellon (1990) and Glazier and Powell (1992). Fidel (1993) reviewed several studies that illustrate how qualitative methods can be applied to research on information retrieval.

But what exactly is qualitative research? As Harter notes in his editorial for a 1993 issue of *The Library Quarterly* devoted to qualitative research:

> A bewildering number of terms have been introduced to refer to the overarching paradigms, philosophical positions, research traditions, and special techniques associated with qualitative research. These include constructivism, ethnography, grounded theory, hermeneutics, interpretative research, member checking, naturalistic inquiry, peer debriefing, phenomenology, postpositivism, and triangulation, among many others. (p. xi)

After noting the absence of a universally agreed-upon definition of qualitative research, Fidel (1993) lists the many names given to qualitative research: ethnography, anthropological methods, interpretive research, field research, fieldwork, grounded theory research, naturalistic inquiry, observation, participant-observer

method, and case-study method. Gorman and Clayton (1997), too, remark on the lack of definitions of qualitative research, and partly for that reason provide their own. It reads as follows:

> Qualitative research is a process of enquiry that draws data from the context in which events occur, in an attempt to describe these occurrences, as a means of determining the process in which events are embedded and the perspectives of those participating in the events, using induction to derive possible explanations based on observed phenomena. (p. 23)

Qualitative research is, of course, the basic alternative to quantitative research, though an increasing number of authors are citing the need to employ a mix of quantitative and qualitative methods so as to address a number of research problems adequately. (For an example of the multimethod approach, see a 1994 report on education for reference / information service by Powell and Raber.)

Specific qualitative methods or approaches identified in LIS texts include: content analysis (Slater, 1990, Westbrook, 1997); visualization (Achleitner & Wyatt, 1992); case study (Fidel, 1992; Gorman & Clayton, 1997); paper trail (Weinberg, 1992); sense-making (Dervin, 1992); focused group interviews (Drabenstott, 1992); observation (Grover & Glazier, 1992; Gorman & Clayton, 1997); group discussion (Gorman & Clayton, 1997); and historical research (Gorman & Clayton, 1997). Other qualitative methods identified by Eliason (1996) include protocols, task analysis, usability testing, and contextual inquiry.

Some of the methods identified above, however, represent specific data gathering techniques more so than broad methodological approaches. Ertmer (1997), for example, focuses on only four major qualitatitive research designs – case study, ethnography, phenomenology, and grounded theory. According to Creswell (1994, p. 12), a *case study* "explores a single entity or phenomenon ('the case') bounded by time and activity (a program, event, process, institution, or social group) and collects detailed information by using a variety of data collection procedures during a sustained period of time." (The case study has been employed for library research for many years and will not be considered further in this article.) Creswell (1994, p. 11) defines *ethnography* as a type of qualitative inquiry in which "the researcher studies an intact cultural group in a natural setting during a prolonged period of time by collecting, primarily, observational data." As cultures are now often defined in terms of smaller units than they once were, an ethnographic methodology might be quite appropriate for studying, for example, the patterns of information use of the research scientists in a single organization. Ertmer (1997, p. 161) briefly defines *phenomenology* as "a research method that attempts to understand participants' perspectives and views of social realities." As "phenomenologists attempt to understand what a specific experience [e.g., use of a library's catalog] is like by describing it as it is found in concrete situations and as it appears to the people who are living it" (p. 161), phenomenological methods

clearly have potential for LIS research. According to Strauss and Corbin (1994, p. 275) *grounded theory* is a "general (research) methodology, a way of thinking about and conceptualizing data" (p. 275); it is a set of procedures for "analyzing data that will lead to the development of theory useful to that discipline" (Strauss & Corbin, 1990, p. 27). "Grounded theorists start with broad research questions that provide the freedom and flexibility to explore a phenomenon in depth" (Ertmer, 1997, p. 163). The fields of library and information science have no shortage of research questions and phenomena needing thorough exploration and continue to need more well founded theories, so there is certainly a need for more grounded theory research.

Ethnography

Reports of research studies that utilized *ethnography* and *grounded theory* and articles about those two methods regularly appear in social science journals. A recent special issue of the *Journal of Contemporary Ethnography* (Lyon, 1997) was devoted to applying ethnography. Topics discussed included the major impediments to applied ethnographic research and the different forms that applied ethnography can usefully take. The *Journal of Social Work Education* recently published an article on teaching ethnographic research methods (Sells, Smith, & Newfield, 1997). The authors described a course with seven modules that covered sampling, data collection, data analysis, theory development, presentation of findings, practical application, and an overview of qualitative research. Gambell (1995) addressed problems of ethnographic research such as veneration of the research participant and the researcher's position in the study.

"In order to collect as much contextual information as possible," Barry (1995, p. 114) used an ethnographic approach based in grounded theory to evaluate the impact of information technology (IT) on information activity in academic research. Further justification for using qualitative methods to investigate this problem can be found in the incomplete knowledge of the basic variables of information seeking and IT-assisted information systems, the complexity of information-seeking, the largely implicit nature of research and information skills, the difficulty in detecting the impact of IT systems, and the difficulty of explaining IT-assisted information systems (pp. 110-113). Consequently, Barry developed a research framework that included the following:

> Holistic, inductive research; a fluid, developing methodology; the use of both idiographic and nomothetic approaches; collection of data on behavior, cognitions, and emotions; techniques to bring implicit knowledge into conscious awareness, such as information access stories and research timelines; and the analysis of both research outcome and process and the investigation of strategies for learning how to use systems. (p.107)

Barry (1997) later used the ethnographic case study approach with her "research activity timeline" to investigate the adoption and use of IT- assisted information systems.

Chatman (1992) used ethnographic methods to investigate the information world of older women who lived alone in a retirement community. She opted to use ethnography because it facilitates collecting data "in social settings that reveal reality as lived by members of those settings" (p. 3). She incorporated social network theory in the analysis and reporting of her findings.

Grounded Theory

In a study that has implications for evaluating reference interviews, Frontman and Kunkel (1994) employed grounded theory to determine counselors' construal of success in initial sessions with clients. Counselors in five mental health fields provided written descriptions of their experience of success in initial counseling sessions. The contents of those reports were coded and analyzed according to the constant comparison method (Strauss & Corbin, 1990). Doing so helped the researchers "to achieve a broad perspective on the experience of success among counselors with varying experience levels, professional identifications, and theoretical orientations" (Frontman & Kunkel, 1994, p. 493).

In another article with implications for LIS research, Pidgeon, Turner, and Blockley (1991) describe the use of grounded theory for the analysis of expert interview transcripts drawn from a knowledge-based systems project. "The discussion focuses upon the processes used to move from an initial unstructured interview transcript to a core set of interrelated concepts, memos and models that fully describe the data" (p. 151). The authors also identify a series of characteristics common to both qualitative social science research and the "knowledge elicitation process."

Phenomenology and Hermeneutics

Studies that suggest how *phenomenological methods* might be applied to LIS problems include one by Attinasi (1990-91) in which he used in-depth phenomenological interviewing as a means by which colleges may better understand and retain their students. The author argues that progress in understanding student outcomes, such as persistence, has been retarded by the failure to take into consideration the meanings the phenomenon of going to college holds for students. In another illustrative study, Pramling (1995) discusses how phenomenology has been used for examining preschool children's understanding about certain aspects of their surrounding world, understanding of their own learning, and ability to learn new content.

The review of the social science research literature turned up other qualitative research methods that are not so easily categorized. Indeed, some qualitative methods are viewed as paradigms, some as philosophies or as perspectives, some as

nearly synonymous with qualitative research; and a number of them overlap with one another. One example of the last occurrence is *hermeneutics.* In a call for greater use of alternative methodologies in social science, and in particular LIS research, Benediktsson (1989, p. 209) quotes Bleicher (1980) in defining hermeneutics "as the theory or philosophy of the interpretation of meaning." And, Benediktsson points out that one cannot study hermeneutics without considering its philosophical foundation – phenomenology. He also notes that there are four major strands in contemporary hermeneutics: hermeneutical theory, hermeneutical philosophy, critical hermeneutics, and Ricoeur's phenomenological hermeneutics. Budd (1995, p. 308) writes:

> Ricoeur states unequivocally that 'phenomenology remains the unsurpassable presupposition of hermeneutics' (Ricoeur, 1991, p. 26). In this vision, phenomenology and hermeneutics are inextricably linked and mutually interdependent. Hermeneutics presupposes that interpretation depends on the meaning of any 'being'; phenomenology depends on interpretation of evidence.

In arguing for applying hermeneutics in LIS research, Benediktsson (1989) comments that "hermeneutics is deeply embedded in the social sciences and humanities, and as such, organically applicable to LIS problems" (p. 202). He quotes Natoli (1982) who stated: "The goal of research in a human study is to recreate the human condition of the object of study in the mind of the reader by utilizing the reader's natural propensity to both experience and understand" (p. 204). Budd (1995, p. 295) argues that hermeneutics represents a revised epistemological approach that seeks an understanding of the essences of things (such as the library) and that takes into account, among other things, the intentional stances of the human actors within the realm of library and information science. Such a reformed epistemology allows for a different set of questions asked and a different approach to answering them." Walker (1996) notes that as hermeneutics research attempts to make meaning of words and narrative and to gain understanding, it is a powerful tool for studying intact texts. Additional justification for the value of hermeneutics comes from Kezar (1995, p. 3) who states that the "hermeneutic circle...provides a helpful framework for understanding the importance of [qualitative] pilot studies within the research process."

A more concrete example of how hermeneutics can be applied to LIS research can be found in Cohen's (1993) paper on the hermeneutics of the reference question. Cohen suggests that "rather than being encased in a static paradigm the reference question is a dynamic interplay between the structures of the 'languages' which constitute the question " (p. 182). Therefore, as he argued, consideration of the reference question needs to take into account the problems of meaning and understanding of the question itself.

Overlapping Methodologies

In a study of online communities, Thomsen, Straubhaar, and Bolyard (1998) employed *ethnomethodology*. They related their approach to epistemology, phenomenology, and ethnography. Along with exploring the basic dimensions of online communities, the researchers considered the concomitant need for scholars to rethink the assumptions that undergird historical paradigms about the nature of social interaction, social bonding, and empirical experience (p. 1).

As further evidence of the overlapping of several of the qualitative research methods, Cohen (1993) also notes that issues underlying the reference question are affected by *structuralist* and *poststructuralist criticism.* Examples of studies based on so-called poststructural or nontraditional analysis include Capper's (1992) examination of the effect of restructuring on the educational experiences of persons affected. She incorporated poststructural theories as they refer to the interactions and contradictions among language, subjectivity, power, and unquestioned underlying assumptions. Capper's methodology involved interviews, document analysis, and classroom observation. A 1995 study (Ma) applied "reader-response criticism" to investigate subject positions of gender, age, ethnicity, and profession through the poststructural analysis of an art work and examined the relationship among viewer, text (the art work), and artist.

Other qualitative research studies appearing in the social science literature are even more difficult to place in a specific methodological category. For example, a number of studies were referred to as *cultural analyses*, and though the authors of the articles examined did not label their studies as ethnographies, they seem to have much in common with ethnographic research designs. Problems investigated in such studies include educational technology (Yeaman et al., 1994) and information systems planning and management (Butterfield & Pendegraft, 1996).

Reflexivity

In an article titled "On Ethnography," Aunger (1995) discusses *reflexivity* – another qualitative approach that is not easily categorized. Indeed, Aunger refers to reflexive as a "somewhat slippery term" (p. 98) while at the same time stating that ethnographic research must be reflexive in nature. He points out that "textualists" emphasize "that the reader's ability to interpret the quality of ethnographic statements must be increased by clues to the origin and nature of ethnographic statements provided in the ethnographic document itself" (p. 98), and for that reason often include original, firsthand narratives in their ethnographic accounts. He also points out that another aspect of reflexivity is the "heightened consciousness about personal experience through self-reflection prior to writing the ethnographic account" (p. 99). Aunger himself argues that all of the interpretation of ethnographic materials cannot be left to the reader so he emphasizes reflexivity as an aspect of analysis, rather than presentation.

Bassett (1995) chronicles the ongoing debate among scholars regarding the nature of reflexivity. She contends that reflexivity is complex, multidimensional, and communal and should be linked to broad social objectives.

In a consideration of humanistic research, especially the literature search, Plum and Smalley (1994) argue that the humanist library patron may be treated as an author of a text and that reflexivity is the positioning of the author within that text. They contend that reflexivity not only "acknowledges the author's presence, it acknowledges that the lines are blurred between the author, the text, and the research" (p. 152). They note that reflexivity is a type of self-consciousness "that not only recognizes the message, but becomes conscious of how that message attained significance" (p. 152).

Symbolic Interactionism

Symbolic interactionism is another qualitative approach that is as much a perspective as a specific method, and "a great many specific definitions and descriptions of the fundamental principles of symbolic interactionism exist" (Petkus, Jr., 1996, p. 189). Mellon (1990) identifies the basic premises of symbolic interactionism as: (1) people act toward things based on what those things mean to them; (2) what things mean to a person develops out of social interaction; and (3) people's actions are based not only on meanings that have developed through past interactions but also on interpretations made by them at the time of new interaction (pp. 14-15). Clearly, a process that takes into account that people create shared meanings through interactions has much to offer research into the many interactions that occur in information organizations and use.

Discourse Analysis

An example of a qualitative method "that draws from the quantitative approaches of several disciplines" (Frohmann, 1994, p. 119) is *discourse analysis*. According to Frohmann (1994), the objects of analysis for discourse analysis are "serious speech acts" or talk conducted by "institutionally privileged speakers," as opposed to ordinary conversation. And it is concerned with the talk itself, not to what it refers. Frohmann (1994, p. 119) states that this method "permits analysis of the ways in which information, its uses, and its users are discursively constructed, especially in theoretical discourses of LIS, such that power over them can be exercised in specific ways."

As Frohmann (1994) notes, discourse analysis has the potential to be a useful research method in library and information science and could be used to consider such questions as the definition of information as affected by new technology; how professional and corporate discourse constructs information so that it becomes the object of professional expertise, administrative structures, or corporate strategies; how information is constructed in the discourse of Melvil Dewey; and the ways in which the identities of information users are constructed in LIS theories.

Additional consideration of how discourse analysis can be applied to the study of information can be found in a 1996 article by Budd and Raber. As they note, "applications of discourse analysis to information include investigation of the social, political, and technical uses of the word 'information' as they have implications for theory and practice" (p. 217). Spencer (1994) discusses the mutual relevance of discourse and ethnography and how sensitivity to this mutual relevance can enrich both approaches to field-based research.

An approach that is related to discourse analysis, though less so than its name might suggest, is *discourse synthesis*. McInnis (1996) refers to discourse synthesis as "a concept that incorporates all activity in scholarship that relates to processes of constructing and validating bodies of knowledge." McInnis (1996, p. 1) goes on to note that knowledge is socially constructed so notions such as "understand," "explanation," "agreed-upon," "consensus," and "concept" are central to discourse synthesis. In a 1996 issue of *Social Epistemology* devoted to discourse synthesis, there are articles relating discourse synthesis to economic history, the literature of health research, mathematical discourse, literary criticism and theory, dictionary-making, encyclopedias, and meta-analysis. One article (Becker, 1996) is an interesting example of how a qualitative method (discourse synthesis) can be used to consider a quantitative method (meta-analysis) by examining the discourse of the latter as evidenced in the published literature.

Other primarily qualitative research methods appearing in the social science literature include semiotics, stimulated recall, and computer visualization. *Semiotics* is the study of signs and messages in society, including the "codes" hidden in the relationships between words. In a 1992 paper, Wagner argues that the semiotic method has the potential to benefit communication research in public libraries. Wagner's paper reviews the semiotic literature, and he notes that "semiotic approaches to the study of librarianship in general, and public librarianship in particular, are scarce" (p. 134). He points out that semiotic methods can be applied to the study of user-public-library interaction, use and users, library performance, information needs, public library staff, and even the siting and architecture of libraries.

This review of the literature did not identify any LIS studies utilizing *stimulated recall* but two non-LIS studies may aid in characterizing this method and indicate its potential for LIS research. A study by Wear and Harris (1994) focused on how stimulated recall methods could be used to make teachers more reflective, that is, teachers who examine their own performance so as to improve it. While noting that video tapes have been used to stimulate recall of teaching events, these researchers used audiotapes, journals, and lesson plans. Mills and Walker (1994) found that skillful counseling can help to stimulate the recall of past events.

A relatively new method that is appearing in the LIS literature is *computer visualization*. In their introduction to this technique, Achleitner and Wyatt (1992, p. 21) write: "Computer visualization allows for a more complex image of reality than was ever possible before." They point out that when the data associated with complicated phenomena are presented in numeric form, they are too complex to understand.

However, "when converted to graphic form and even animated, the information is much clearer and observation of underlying patterns is facilitated" (p. 22).

Another useful overview of computer visualization can be found in the *Annual Review of Information Science and Technology* (Williams et al., 1995). This article provides background on the use of the computer to support visualization and reviews the visualization research literature. MacCormac (1990) more directly relates visualization to information. He argues that "Libraries can contribute to rapid economic development in high technology by extending their computer-based information services to include image processing. Such an extension will require librarians to become active and integral parts of research teams" (p. 73).

A related method focused on a specific type of information is the *geographic information system* or GIS. In defining a geographic information system, Cox and Gifford (1997, p. 449) quote Aronoff (1989, p. 2) who stated: "A GIS is designed for the collection, storage, and analysis of objects and phenomena where geographic location is an important characteristic or critical to the analysis." This definition is a broad one, not limited to the computer environment. Hernon and Lopez (1996, p. 234), however, define GIS as "a computerized system that captures, stores, manipulates, analyzes, and presents geo-coded date..." They also present a useful consideration of public policy issues related to GIS.

Useful introductions to GIS library services are provided by a special issue of *The Journal of Academic Librarianship* (Hernon, 1997), an Association of Research Libraries SPEC Kit (Soete, 1997), and the proceedings of the 1995 Clinic on Library Applications of Data Processing (Smith & Gluck, 1996). At least one of the clinic's papers considers how geographic information systems can be used more as a research method than as a library service or source of data for patrons. Koontz (1996, p. 181) describes how GIS software "can facilitate library market analysis by graphically estimating geographic boundaries and analyzing socioeconomic characteristics within prescribed markets in an online environment." In a related paper, Jones (1993) explains how a geographic information system was used to map the spatial distribution of public library users. Ottensmann (1997) describes geographic information systems and the collection of data for analysis for the Indianapolis-Marion County Public Library (Indiana). He also gives examples of possible analyses: distribution of library patrons, distances patrons travel to use libraries, branch library services and characteristics of populations served, numbers of patrons served and prospective new library locations, and distribution of uses of types of materials. Clark (1995) discusses several specific GIS techniques (including thematic mapping, data maps, and geocoding) that are available to LIS researchers and administrators.

QUANTITATIVE METHODS

With the consideration of geographic information systems, this review has shifted from predominantly qualitative methods to those that are mostly quantitative in

nature. The review of the literature suggests that with regards to quantitative methods, there are fewer new developments. And here again, some of the methods are difficult to categorize and can represent a mix of both quantitative and qualitative approaches. For example, in an article about building a framework for *benefit-cost analysis*, Holt and Dussold (1996) point out that public institutions tend to measure benefits qualitatively. Yet, costs, of course, lend themselves to quantitative measurements. A recent example of a *cost-effectiveness study* can be seen in Black's (1997) description of a method for analyzing the cost-effectiveness of a liberal arts college's journal collection. His data, which were entirely quantitative in nature, included journal use, journal subscription prices, and course enrollment. In a more unusual cost study, McGrath and Senglaup (1998) used Statistical Process Control and the Taguchi Loss Function—procedures which "can be applied to any library operation, process, product or service where cost, time and performance are considerations" (p. 1). The project was designed to improve the quality of interlibrary loan (ILL) services by reducing the variance or the number of ILL turnaround times that are significantly longer than the mean turnaround time.

Another primarily quantitative method being increasingly used to deal with cost and economic variables is *discrete choice analysis* (also known as *conjoint analysis*). This method allows the researcher to focus directly on the individual's decision-making process as affected by variables such as cost. Morley (1994), for example, used an experimental design and discrete choice analysis to determine the effects of travel related costs on the destination choices of tourists. Discrete choice modeling has been utilized to generate "share of brand choices" in marketing research (Golanty, 1995). Sone (1988) applied discrete choice analysis to the modeling of public library use and choice behavior. In conjunction with a user study, Sone formulated two library choice models and applied one to the problem of predicting how many users would choose to use a new branch library or the central library under different combinations of location and book collection. Sone's use of the binomial logit model limited him to the consideration of two independent variables. A multinomial logit model can be used to consider more than two independent variables.

Another primarily quantitative method that is increasingly popular is *transaction log analysis* (TLA):

> For the purposes of library and information science research, transaction log analysis can be narrowly defined as the study of electronically recorded interactions between online information retrieval systems and the persons who search for the information found in those systems.
>
> Researchers most often use transaction log data with the intention of improving an information retrieval system, human utilization of the system, and human (and perhaps also system) understanding of how the system is used by information seekers (Peters et al., 1993, p. 37).

In his consideration of transaction log analysis as a research methodology, Kaske (1993) raises several related issues and questions. Among the latter is whether transaction log analysis is a quantitative or qualitative method. He concludes that "human/computer interaction is just too complex to be studied by only a qualitative or quantitative method" (p. 83); TLA can benefit from both approaches. Drabenstott and Weller (1995) describe how transaction logs can be used in conjunction with related methods, such as experiments, to test a system's subject access. McGlamery (1997) used transaction logs to analyze the use of a digital geodata collection maintained at the University of Connecticut. Ciliberti, Radford, and Radford (1998) used TLA to verify the accuracy of user self-reports in availability research. Other purposes for which transaction log analysis has been used recently include: the improvement of OPAC retrieval results (Blecic et al., 1998); the determination of the value of various access points to searchers who requested location information for items (Wyly, 1996); and an assessment of the success of point-of-use instruction for users of OPAC terminals (Atlas, Little, and Purcell, 1997).

Web log analysis (WLA), a type of transaction log analysis, has developed in recent years along with the need to analyze information-seeking behavior at Web sites. At the same time, WLA studies "continue to pursue some of the long-standing goals of traditional transaction log analysis: how many users use the system for a given period of time (e.g., hour, day, and week); where do the users come from; what are some of their basic demographic characteristics; how do they behave when they are in the system or at the site; when are the periods of peak demand; which resources within the site are most popular" (Peters, 1996, p. 3). Most transaction log data are collected by the system under study; most Web transaction data are collected by Web server logging software that also has the ability to analyze the data and present the results in a variety of graphical formats (Peters, 1996, p. 4). A useful consideration of Web analysis software can be found in a recent paper by Bertot, McClure, Moen, and Rubin (1997).

A less commonly used technique for studying the user interface is *protocol analysis* – a precursor of transaction log analysis. Protocol analysis has been called "the thinking aloud technique" because it represents an analysis of searchers' spoken thoughts as they conduct their information search (Peters, 1991, p. 151). During a protocol analysis the user verbalizes the decisions and behaviors that he or she is performing. The technique has been used in a number of studies of catalog subject searching behavior (see, for example, Sullivan's and Seiden's (1985) protocol study of OPAC users at Carnegie-Mellon University). Wiedenbeck, Lampert, and Scholtz (1989) discussed using protocol analysis to study the computer terminal-user interface. A book-length consideration of protocol analysis was published in 1993 (Ericsson and Simon). Wilson (1994) addressed the methodological concern that a think-aloud methodology can affect people's cognitive processes, as well as their behavior.

Another aspect of the human/system interface that is receiving some attention from researchers is the *usability* of the system. In a highly quantitative paper, Mitta

(1991) describes a methodology for calculating expert system usability. She notes that expert system usability is determined by solution accuracy and interface quality and defines interface as "the text and graphics-based information presented on the system's display medium" (p. 233). A linear multi-variate function for measuring usability is described.

Statistical Methods

This consideration of the current state of research methodology will close with a brief mention of some techniques that are as much or more statistical analysis procedures as they are research methods. *Meta-analysis*, for example, "is a quantitative statistical tool for combining research studies with a small population to achieve a larger effect in size" (Smith, 1996, p. 265). In an earlier article in *The Library Quarterly*, Trahan (1993) discussed applying meta-analysis to library and information science research. In an interesting example of this method, Saxton (1997) used meta-analysis to synthesize the large volume of data describing numerous independent variables and their correlations with reference accuracy.

Other predominantly statistical methods appearing in the literature include path analysis, modeling, and secondary analysis. *Path analysis* is a technique that uses linear regression techniques to test the causal relations among variables. It involves: (1) drawing a path diagram based on a theory or set of hypotheses; (2) calculating path coefficients (direct effects) using regression techniques; and (3) determining indirect effects (Nachmias & Nachmias, 1987, p. 456). *Modeling* involves the use of simplified representations of real-world phenomena and is often used to determine the performance of a real system by examining the behavior of an analogous system. *Secondary analysis* entails the additional analysis of research data that were collected and analyzed in a previous study and for somewhat different purposes.

THE FUTURE

What the future holds for social and behavioral science research methods is, of course, uncertain. Current trends in LIS research that are likely to continue include an increasing use of qualitative methods, more multidisciplinary research, more research that addresses problems in information technology and information studies, more studies employing multiple methods, and relatively more applied research studies. At the same time there will be a continuing need for sound theoretical or basic research studies and for the utilization of traditional research methods and data collection techniques. There is also a need for another *comprehensive* analysis of LIS research such as the one done by Schlachter and Thomison (1982).

Smith and Torrey (1996, pp. 611-612) recently identified five challenges facing researchers in the social and behavioral sciences. They represent the need to:

- Integrate current data sets;
- Improve the coverage of longitudinal surveys;
- Experiment with new methodologies to study nonlinear, dynamic systems;
- Develop comparable international research to determine both the incidence and prevalence of behavioral and social phenomena; and
- Integrate quantitative and qualitative research methods more systematically to advance new theory.

Smith and Torrey conclude that the subjects of the social and behavioral sciences are more complex than the research tools currently available to investigate them. Thus there is a need to develop and employ new research methodologies. As is the case in other fields, researchers in library and information science should consider expanding their methodological repertoire as they attempt to resolve the many research problems confronting them.

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