



### 3. Literature review

#### 3.1. Surveys of research methods used in LIS

Bernhard (1993) performed a review of research articles as found in five kinds of studies: 1) content analyses of core journals, 2) content analyses of specific journals, 3) reviews of doctoral theses, 4) analyses of secondary journals, and 5) analyses of other sources. In conjunction with 11 textbooks on research methods in LIS and two reference sources (Soper, Osborne, & Zweizig, 1990; Young, 1983), Bernhard identified 13 research methods: bibliometrics, case study, comparative study, content analysis, Delphi method, ethnographic research, evaluative study, experimental research, historical research, information systems design, operations research, survey, and theory development.

Järvelin and Vakkari (1990) categorized 833 articles published in 1985 from 37 core LIS journals by research strategies (empirical research, conceptual research, mathematical/logical method, system & software analysis & design, and literature review) and data collection methods (e.g., questionnaire, interview, observation, thinking aloud, content analysis, citation analysis, and historical source analysis). Using the same procedure, Kumpulainen (1991) examined 632 articles from 30 core LIS journals published in 1975 and concluded that empirical research methods/strategies accounted for close to 51% of all the selected studies, with historical method (13.1%) and questionnaire and interview (combined as one category, 10.9%) rounding out the top of the list of data collection methods used in LIS. It should be noted that 47.9% of the articles included in the research were labeled as “not applicable (nonemp. study)”, meaning that those articles of non-empirical studies did not use an identifiable method of data collection. Based on the taxonomy developed by Järvelin and Vakkari (1990), Hider and Pymm (2008) conducted a content analysis of articles from 20 LIS journals indexed in *Journal Citation Report* (JCR) and published in 2005. They found that survey remained the predominant empirical research strategy in both library science and information science. Meanwhile, the authors observed a marked increase in experimentation.

Blake (1994), on the other hand, analyzed LIS dissertation abstracts over a period of 15 years (1975–1989) and reported the following research methods: descriptive, case study, bibliographic, historical/biographical, survey (questionnaires, interviews), bibliometric (including citation studies), content analysis, modeling, quasi-experimental, experimental, theory, combinations, and others. In comparing LIS research methods curricula in Korean and U.S. universities, Park (2004) showed that survey/questionnaire, experiment, historical method, interview, ethnography, observation, desk research/literature review, comparative study content analysis, evaluative research, bibliometrics, case study, information system design, action research, Delphi study, focus groups, and field study were covered in those courses. Some of these (e.g., field study and focus groups) had not appeared in previous studies, possibly indicative of the changing scene of research methods in the field of library and information science.

Researchers in LIS appear to employ more sophisticated research methods and techniques (Blake, 1994; Enger, Quirk, & Steward, 1989; Park, 2004) instead of the commonly used survey (Hider & Pymm, 2008; Järvelin & Vakkari, 1990; Peritz, 1980) or dominant historical method in the past (Schlacter & Thomison, 1974, 1982). For instance, research using experiments and modeling is on the rise (Blake, 1994; Hider & Pymm, 2008). Methods such as ethnography, focus groups, and thinking aloud are covered in LIS education (Park, 2004).

#### 3.2. Other recurring themes of research methods in LIS

As what is researched in library and information science requires the usage of quantitative and qualitative approaches, the integration of both would help enhance the quality of LIS research (Fidel, 2008). To do so more systematically might also advance new theories. “Scientific theories come not only from quantitative data, but also from qualitative

study. ... The more complex the problem, the more numerous are the sources of evidence needed, such as structured observations, formal case studies, and historical research” (Smith & Torrey, 1996, p. 612).

Heron and Schwartz (2003), coeditors-in-chief of *Library & Information Science Research*, were hopeful about the use of qualitative research in LIS:

The toolkit of methods applicable to LIS research has expanded, especially in the arena of qualitative methods. Researchers now have more choices and, more than ever, have clear alternatives to the use of survey research. ... The application of methods drawn from other disciplines is relevant and is becoming increasingly frequent in LIS research. Further uses of these methods will become evident as the range of problems that LIS researchers investigate expands. (p. 1)

There has been a modest increase in the past several decades in the use of qualitative approaches, excluding historical research which showed a noticeable decline (Hider & Pymm, 2008). Fidel (1993) demonstrated, through a review of qualitative research methods used in information retrieval (IR), that the number of IR research projects applying qualitative methods was on the rise. In an examination of articles from three Chinese and 10 non-Chinese core LIS journals published during 2001–2010, Zhang et al. (2012) echoed the findings of Hider and Pymm (2008). However, Zhang et al. defined qualitative research as any publication that contained no use of statistics, and so this included discussion or opinion pieces that are not examples of research at all.

Another topic of concern regarding research methods in LIS is the use of multiple or mixed methods. Järvelin and Vakkari (1990) recorded studies that had several methods for data collection in their research while Fidel (2008) scrutinized 465 articles published in 2005–2006 in four LIS journals (*Information Processing & Management*, *Journal of Documentation*, *Journal of the American Society for Information Science & Technology*, and *Library & Information Science Research*) to find out the degree to which mixed methods were used. Among all the studies Fidel inspected, only 5% employed mixed methods. She distinguished between mixed methods, “multiple methods” (17%), and “two approaches” (qualitative and quantitative; 8%). Multiple methods articles used one approach for data analysis while articles characterized as two approaches failed to mix the quantitative and qualitative approaches throughout. The taxonomy Fidel (2008) developed, however, led the author herself to admit that “identifying the 22 articles (of mixed methods) was sometimes complicated” (p. 270).

Taking a philosophical stance, Ma (2012) elaborated on the need for combining quantitative and qualitative approaches to research in library and information science because information is known for its simultaneously objective, subjective, and normative–evaluative nature. Generally speaking, qualitative research is associated with hermeneutics, constructivism, and relativism, whereas quantitative research is related to positivism and empiricism. Although Ma does not give a definition for mixed methods, she suggests that “mixed methods research that combines large-scale data analyses and a detailed description of community practice may provide us with a richer understanding of information and information-related phenomena” (p. 1866).

### 4. Data collection and analysis

Research articles published between 2001 and 2010 were obtained from *Journal of Documentation* (JDoc), *Journal of the American Society for Information Science & Technology*<sup>1</sup> (JASIS&T), and *Library & Information Science Research* (LISR). Editorials, literature reviews, book reviews, letters to the editor, and any other non-research articles were excluded. The three journals were chosen as data sources for this study because

<sup>1</sup> ASIS&T changed its full name from American Society for Information Science & Technology to Association for Information Science & Technology in 2012.

**Table 1**  
Profile summary of JDoc, JASIS&T, & LISR.

Profile feature	JDoc	JASIS&T	LISR
Focus	Theories, concepts, models, frameworks, and philosophies in the information sciences	The production, discovery, recording, storage, representation, retrieval, presentation, manipulation, dissemination, use, and evaluation of information and on the tools and techniques associated with these processes	The research process in library and information science as well as research findings and, where applicable, their practical applications and significance
Publisher location	UK	USA	USA
Size	Bi-monthly, 5–7 articles/issue	2001–08: 14 issues/year, 5–18 articles/issue; 2009–10: 12 issues/year, 15–16 articles/issue	Quarterly, 2001–03: 4–6 articles/issue; 2004–10: 6–8 articles/issue
Impact factor (2012)	1.138	2.081	1.755
Indexed in...A&I products	Over 30	Close to 50	Over 20
Editor-in-chief	David Bawden	Donald Kraft (2001–08), Blaise Cronin (2009)	Peter Hernon & Candy Schwartz

they have also been selected by previous studies on research methods (Fidel, 2008; Järvelin & Vakkari, 1990), and all three are core journals in library and information science research (Table 1).

The data collection yielded 1162 research articles from the three journals chosen (Table 2). Due to an unanticipated time constraint, only articles from JASIS&T in 2001–2002 and 2009–2010 were included in the data analysis and reported below. Data for the remaining six years (i.e., 2003–2008) of JASIS&T were gathered after the current research concluded and will be reported in another study subsequent to the present one.

A coding schema of research methods used in LIS was developed (Table 3) by two coders based on analysis of all the research articles in JDoc and LISR. It was further refined while coding research methods reported in the JASIS&T articles in the two time periods (i.e., 2001–02 & 2009–10). Coding results by the two coders for a randomly selected sample of 30 articles, 10 from each of the three journals, were compared for consistency. The intercoder agreement rate between the two coders was 86.7%, exceeding the acceptable rate of 80% (Neuendorf, 2002, p. 143). This intercoder agreement rate also indicates that both the coding schema and coding process are reliable. For the cases of disagreement, the two coders discussed the cases and reached a consensus. It should be noted that the research methods listed in this coding schema were named primarily after data collection techniques, for example, questionnaire or interview. This naming convention appeared to be logical as well as informative. The current study did not consider research paradigms (e.g., naturalism, phenomenology, and positivism) when naming research methods, as research paradigms are more at the conceptual level than directly linked to any specific data collection methods.

If one study used more than one method, each method was recorded in the order in which it was reported in the article. If a study adopted a true experimental design in the form of experimental vs. control groups with a pre-test, treatment, and post-test, it usually would employ at least one other research method (e.g., questionnaire or interview) for performing the pre-test and post-test. That study would then be coded once as experiment and also for other research method according to what was actually used for data collection. In contrast, research using quasi- or pre-experiments was simply coded in this study as experiment. No weights were assigned to any of the

**Table 2**  
Frequency distribution of research articles by journal.

Year	JDoc	JASIS&T	LISR
2001–2010	367	1250+ (estimated)	241
2001–2002	58	205	33
2009–2010	82	349	54

multiple methods applied in a single study, as this would add an element of subjectivity. The collected data were then analyzed quantitatively and qualitatively.

## 5. Findings

### 5.1. Research methods used in LIS

The top five research methods used in all three journals are listed in Table 4. It must be pointed out that the percentage total in each column of Table 4 would exceed 100 if all methods other than the top five were also included in the computation, since each method in any multiple-method studies was counted once in the tally. For example, a study using questionnaire, interview, and observation as research methods received three individual counts of one.

Out of the top five research methods identified, the three journals shared four, with an accumulative percentage of 65 (theoretical approach), 57 (content analysis), 55.8 (questionnaire) and 53.4 (experiment) respectively. Theoretical approach tops the list in the case of JDoc, experiment leads in JASIS&T, and content analysis prevails in LISR. The only two research methods that did not make the list of the common four in Table 4 are interview (in JDoc & LISR) and bibliometrics (in JASIS&T). Unlike earlier findings (Hider & Pymm, 2008; Järvelin & Vakkari, 1990), questionnaire survey and historical method no longer dominate LIS research as leading methods across the three journals examined in this study.

Table 5 shows both the frequency and corresponding order in which a particular method is reported in the data set. For example, for JDoc, content analysis was chosen as a research method in a total of 52 studies, of which 37 listed content analysis as the first (or only) research

**Table 3**  
Coding schema for research methods.

Bibliometrics (including citation analysis, informetrics, & scientometrics)
Content analysis (including discourse analysis)
Delphi study
Ethnography/field study
Experiment
Focus groups
Historical method
Interview
Observation
Questionnaire
Research diary/Journal
Theoretical approach (e.g., conceptual analysis, modelling, theory building)
Think aloud protocol
Transaction log analysis
Webometrics (Including link analysis, cybermetrics, altmetrics)
Other methods (e.g., action research, card sorting, information horizon)



**Table 6**  
Number of research methods.

Number of methods	JDoc (%)		JASIS&T (%)		LISR (%)	
	2001–02	2009–10	2001–02	2009–10	2001–02	2009–10
One	83	77	76	87	79	82
Two	10	20	16	9	16	13
Three	5	3	6	2	3	3
Four	2	0	2	1.7	2	2
Five			0	0.3		

is the use of multiple research methods in individual studies and the other is the amount of qualitative research as compared with quantitative studies.

Two sets of data were extracted from what this study already collected, one covering the time span of 2001–02 and the other for 2009–10. As before, each method is counted once as it appeared in the publication. There appears to have been no increase in studies that used more than one research method except in the case of JDoc (Table 6). To the contrary, a decrease is observed in JASIS&T (–11%) and LISR (–3%). This result is somewhat unexpected because many researchers (e.g., Fidel, 2008; Ma, 2012) have advocated or promoted the use of multiple methods in LIS research. One possible explanation for this outcome is the short time span this study examines. That is, six years between 2001–02 and 2009–10 are too short to allow any noticeable change to take place regarding the use of multiple methods.

Growth in qualitative research was also examined. Data collection techniques (e.g., questionnaire, interview) alone cannot indicate whether a study is quantitative or qualitative. Most, if not all, data collection techniques can be used to gather both kinds of data, although they are usually more suitable for one approach over the other. For example, questionnaire is one of the most common techniques for collecting quantitative data, but can also be used for gathering qualitative data via open-ended questions. An interview, likewise, can be used for collecting quantitative data with the help of factual questions even though it is ordinarily employed for gathering qualitative data. Similarly, quantitative data can be analyzed qualitatively in certain cases (e.g., exploring the implication of quantitative results) whereas descriptive statistics (e.g., frequency and percentage) are sometimes computed with qualitative data in order to gain a quick overview. In essence, no research method is completely quantitative or qualitative although each method by nature is oriented toward one of the two.

Of the three sets of top five research methods used in each of the three journals (Table 4), content analysis, interview, and theoretical approach are more likely to be used in qualitative approaches, while bibliometrics and questionnaire generally indicate quantitative analysis. Experiment, the remaining research method under consideration, can go in either direction on the quantitative and qualitative spectrum. Whether an experimental study is qualitative or quantitative ultimately depends on the techniques it employs for data collection. For example, if an evaluation of an information retrieval system relies on questionnaires and test searches for data collection, it would most likely be quantitative. A study of information seeking behavior, on

the other hand, would probably be mainly qualitative if it adopts the think aloud protocol. Experiment therefore is not included in this analysis (Table 7), which categorizes the articles by research approach (quantitative or qualitative) and the top research methods (bibliometrics, content analysis, interview, questionnaire, and theoretical approach) along with corresponding percentages for the two time periods of 2001–02 and 2009–10.

There was a very slight increase of qualitative research in JDoc (i.e., +5.3%) and LISR (i.e., +2%) from 2001–02 to 2009–10, while the percentage of qualitative studies in JASIS&T decreased by four during the same two periods of time. There is no evidence, then, that more studies took the qualitative approach in 2009–10 than that in 2001–02. It is perhaps surprising that there has not been an increase in the use of qualitative research in LIS, especially considering that efforts have been made to encourage and promote qualitative studies (Fidel, 1993; Hernon & Schwartz, 2003). As with multiple methods, it is possible that changes take longer to occur than in the time span under observation. Moreover, only the top five methods (excluding experiment) in the three journals are considered in Table 7; inclusion of additional methods might show a different pattern.

## 6. Discussion

### 6.1. Implications

The LIS field is maturing in terms of research method selection and application in that a greater number and wider variety of research methods are used in all the research publications this study examines. All the methods reported in the 1162 scholarly publications in a sense constitute a toolbox of research methods. Scholars are no longer limited to the research methods traditionally applied in LIS explorations (e.g., questionnaire and historical method). Researchers can instead choose research methods from this expanded toolbox according to their study objectives.

Each research method has its advantages and limitations regardless of how long or how widely it has been used in the LIS domain. If more than one method is used in a single study, the methods can complement one another and integrated together they may address any limitations of a single method. Since there has not been an observable increase in adoption of multiple research methods, perhaps more efforts in the form of education, training, and advocacy are needed to promote the use of multiple methods. Likewise a lack of growth in the use of qualitative research suggests that efforts should be made to increase awareness of qualitative methods and their application to LIS research problems. The current study is a first step in what will be a further effort to help LIS researchers gain a better understanding of research methods and subsequently to make more informed decisions about research method selection and implementation.

### 6.2. Limitations

Only three LIS journals are included in this research, which undoubtedly affects the representativeness of the field. Data from additional LIS

**Table 7**  
Categorization of studies by research approach and method.

Research approach • Method	JDoc (%)		JASIS&T (%)		LISR (%)	
	2001–02	2009–10	2001–02	2009–10	2001–02	2009–10
Quantitative	17.2	17	32	40	21	36.7
• Bibliometrics	8.6	3.6	17	26	3	3.7
• Questionnaire	8.6	13.4	15	14	18	33
Qualitative	56.6	61.9	37	33	42	44
• Content analysis	12	14.6	5	18	24	28
• Interview	8.6	7.3	11	8	18	7
• Theoretical approach	36	40	21	7	0	9

