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Abstract: This study describes a content analysis aimed at identifying the distribution of empirical research strategies and techniques reported in high-profile LIS journal literature published in 2005. For each article, researchers identified the overall research strategy, the data collection technique, and whether the type of analysis was quantitative or qualitative. The taxonomies used in the analysis were those based on JÃ¤rvelin and Vakkari's [JÃ¤rvelin, K., & Vakkari, P. (1990). Content analysis of research articles in library and information science. Library & Information Science Research, 12, 395-422] study in order to compare the results with the earlier findings derived from the 1975 and 1985 literature. The survey approach remains the predominant research strategy in both library science and information science. However, there was a marked increase in experimentation. There were more modest increases in the use of qualitative approaches, except for historical research, which showed a marked decline. This study's findings will inform development of methods courses in doctoral programs, which aim to cover the most commonly used strategies and techniques in contemporary LIS research. Revised taxonomies, which include previously unspecified strategies and techniques such as ethnography and transaction log analysis, are suggested for future content analyses of LIS research.

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Empirical research methods reported in high-profile LIS journal literature

Abstract

This study describes a content analysis aimed at identifying the distribution of empirical research strategies and techniques reported in high-profile LIS journal literature published in 2005. For each article, the overall research strategy was identified as was the data collection technique, and whether the type of analysis was quantitative or qualitative. The taxonomies used in the analysis were those based on Järvelin and Vakkari's previous study (1990), so that the results could be compared with the earlier findings derived from the 1975 and 1985 literature. The survey approach remains the predominant research strategy in both library science and information science. However, there was a marked increase in experimentation, and more modest increases in the use of qualitative approaches, except for historical research, which showed a marked decline. The findings will inform development of methods courses in doctoral programs, where an aim is to cover the most commonly used strategies and techniques in contemporary LIS research. Revised taxonomies, which include previously unspecified strategies and techniques, such as ethnography and transaction log analysis, are suggested for future content analyses of LIS research.

1. Introduction

Recent surveys in the United Kingdom (Morris, 2006), the United States and Korea (Park, 2003; 2004) have found library and information science (LIS) departments offering a wide range of research methods courses, even though many of the courses were not compulsory, with differing emphases placed on various types of methodology and method. This variation may reflect, amongst other things, variations of research interests and expertise across LIS departments, and the topics and approaches of their respective research students, at a particular point in time (although Park (2004) in fact finds a lack of correspondence with research students' methods in some US courses). While it is obviously important for research methods courses, particularly in doctoral programs, to cover in depth those methods likely to be appropriate for the research proposed by the students taking the courses, it is also important for syllabi to cover a broad range of methods so that students may appreciate why the methods they select are appropriate and so that they have some grounding in other methods that they may wish to utilise in the future, perhaps outside of that particular LIS department. For MLS students, exposure to a wide range of methods is needed given the wide range of professional contexts in which future research may be carried out or encountered. Furthermore, a methods course in a doctoral program which focuses too acutely on a particular set of strategies and techniques, at the expense of other commonly used approaches, may end up creating a self-fulfilling prophesy – research students (and perhaps academics) who join the department might do so partly because of the emphasis placed on particular methodologies and research areas. On the other hand, it would be impractical for any methods course to cover every single method ever devised. When deciding on which methods need to be covered, and to what depth, course developers may wish to consider which methods are the most commonly used in LIS research, or at least, those methods most commonly used in quality LIS research. In MLS programs, it may be appropriate to define LIS research primarily in terms of the

research carried out by or for practitioners; in doctoral programs, research may be appropriately defined in terms of that carried out within the academy.

2. Problem statement

LIS researchers and research students need to be familiar with the strategies and techniques they are likely to encounter, and possibly select, as they go about their research. The problem is that LIS is a very broad discipline, or meta-discipline, and uses a wide variety of continuously evolving strategies and techniques. Researchers with a finite amount of time cannot fully master all the strategies and techniques on offer, and must therefore be selective and focused. To this end, it is important for them, and for those designing methods courses in LIS doctoral programs, to know which research strategies and techniques are being applied in current high-profile LIS academic research. Given that LIS methods courses generally focus on empirical research, non-empirical strategies, such as conceptual and mathematical methods, were not covered in this study. High-profile research was defined in terms of that reported in top-rated research journals.

The two primary research questions were:

1. Which strategies and techniques are most used in current, high-profile LIS research?

2. What are the trends in the use of LIS research methods?

The second question was answered by comparison with earlier studies based on 1975 and 1985 literature.

3. Literature review

Several content analyses of LIS research literature have been conducted previously, though most of these are somewhat dated. Bernhard (1993) provides a helpful summary of earlier studies, and combines the results of these and a study of the coverage of methods in various textbooks and reference works to produce a list of thirteen 'methods' considered the most important in the discipline. Her analysis shows a good deal of convergence amongst the earlier studies, in terms of both classification and prevalence of methods. Most of the studies are based on journal literature, though some are based on secondary sources or dissertations. In addition, some compare different periods (generally defined as a year), and most examine other aspects as well as methodology, particularly subject.

Some of the studies cited by Bernhard are criticized by Järvelin and Vakkari (1990) for a lack of refinement in their analysis of methodology and method. By contrast, their own study breaks methodology and method down into four variables: type of investigation, research strategy, data collection method, and type of analysis. The type of investigation might be regarded as the *general* methodological approach – types include empirical, descriptive, comparative, and conceptual. Although Järvelin and Vakkari (1990) also have a *no research* category, they define research very broadly; elsewhere, research papers might be distinguished from conceptual and descriptive (or professional) papers, for instance. Most of the types of investigation correspond to one or more research strategies, with the empirical type being the most subdivided, accounting for twelve strategies. In current methods language, these strategies would often be referred to as specific *methodologies* (Crotty, 1998). Järvelin and Vakkari go on to classify their empirical research strategies according to

two other variables: first, in terms of data collection method (which elsewhere might be referred to as *technique*) and second, in terms of data analysis – either qualitative or quantitative. These two additional variables would appear to be a useful refinement, as it is certainly not the case that particular strategies necessarily entail particular collection or analytical techniques.

Bernhard (1993) includes Järvelin and Vakkari's study (1990) and draws from their *strategies* for her list of lists of research methods, which follows:

Content analysis
Information systems design
Survey
Bibliometrics
Comparative studies
Case studies
Ethnographic research – naturalistic enquiry
Evaluative studies
Experimental research
Historical research
Theory development
Delphi method
Operations research – systems analysis

Bernhard also offers definitions for each of these, something surprisingly lacking in the reporting of most of the content analyses. Much of Bernhard's list is covered in the strategy classification devised by Järvelin and Vakkari, including information systems design, which they placed outside of the empirical research strategies. Ethnographic research and Delphi method were presumably covered by Järvelin and Vakkari's qualitative method and survey, while theory development was covered by their conceptual research strategies (verbal argumentation and conceptual analysis). Comparative studies, on the other hand, was not listed by Järvelin and Vakkari as a strategy, only as a type of investigation, while operations research was not listed by them at all.

Järvelin and Vakkari's analysis (1990) is one of the more recent and sophisticated, even though it is based on articles published in 1985. They use 37 LIS journals, which are identified as core according to such criteria as widespread distributions and international editorial boards. They argue that their exclusive use of journal articles would not significantly bias results, particularly as much of the research reported in monographic and other non-journal literature is also written up in journals. A total of 449 research articles (according to their broad definition) were examined, and classified according to seven variables, including the four variables described above. For each of the variables, Järvelin and Vakkari's categories were designed to be mutually exclusive, so presumably they determined the primary strategy and technique in cases where mixed strategies and techniques were deployed (and reported).

Kumpulainen (1991) followed up on Järvelin and Vakkari's study (1990) using the same classification scheme to investigate the research areas and methods of 1975 LIS journal literature. Her list of 30 journals was based in part on Järvelin and Vakkari's list, though some revision was necessary so that it reflected those journals which would have been the most core a decade earlier. In those journals, Kumpulainen examined 359 research articles.

There has been little content analysis performed on more recent research literature with respect to research methods, though Julien (1996) looked at methods reported in the information needs and uses

literature from 1990-1994, and Clyde (2004) examined school librarianship literature from 1991-2000. Blake's study (1994) of LIS dissertation abstracts from 1975-1989 revealed some differences in the distributions of methods used by library science and information science research students, with much more experimentation being performed by the latter, though the survey was still the most popular across LIS. Blake also detected greater methodological variation in information science, the demise of the historical method, and the general reduction in numbers of library science dissertations. Outside of content analysis, Powell (1999) identifies some emerging trends in both qualitative and quantitative research; there has also been a fair amount of discussion about the place of research in the profession, culminating in the rise of evidence-based librarianship (Crumley & Koufogiannakis, 2002). Meanwhile, both Park (2004) and Morris (2006) have conducted a different kind of content analysis – of the documented curricula themselves. Park examined methods subjects taught in the US and Korea, while Morris looked at UK courses. They both found wide variations across departments, with some emphasising qualitative methods, and others quantitative methods, and marked differences in course length and subject depth. This would appear, in fact, to reflect the wide range of methods employed across the discipline, as described by Eldredge (2004) in his inventory of LIS methods.

4. Research design

4.1. Construction of classification scheme

This paper describes a content analysis of contemporary LIS research literature, which aimed to identify the most common strategies and techniques employed by LIS researchers carrying out high-profile empirical research. The study utilized the relevant parts of Järvelin and Vakkari's classification scheme, as their taxonomies were relatively refined, have been used by subsequent researchers and established with reference to empirical data, and because they allowed comparison with previous years – 1975 (Kumpulainen, 1991) and 1985 (Järvelin & Vakkari, 1990).

Järvelin and Vakkari's eleven empirical research strategies were thus included in this study's strategy classification, even though *secondary analysis* was a strategy which overlapped with the other ten (and was not considered particularly useful). However, as recent literature tends to label many of these strategies as methodologies rather than methods, we have revised the terminology, for the sake of clarity, so as to avoid the term *method.* Also, one extra category was included, namely, *mixed strategies.* All of Järvelin and Vakkari's non-empirical strategies were excluded, including their *system and software analysis and design* and *operations research* strategies. All other strategies not specifically covered by the classification were classed under *other strategy*, unless they were qualitative – in which case they would be classed under *qualitative strategy.* It is recognised that the classification includes categories which might be considered research designs or methods, as well as those that might be considered methodologies, but the scheme was retained in order to facilitate comparison with the results of the earlier studies. The full array of eleven categories is listed below.

Strategy
Historical research
Survey
Qualitative strategy
Evaluation
Case or action research
Content or protocol analysis

Citation analysis
Other bibliometric analysis
Secondary analysis
Experiment
Other strategy
Mixed strategies

Some of the strategies in the classification have been variously defined, and might be considered to overlap with other categories, so to assist the analyst the relevant definitions proposed by Bernhard (1993) were adopted. For the purposes of this study, action research is subsumed under Bernhard's case study definition, and protocol analysis is subsumed under her content analysis definition.

Corresponding definitions did not exist, however, for *citation analysis* and *other bibliometric analysis* (these were treated together by Bernhard), nor for *secondary analysis* and *qualitative strategy*, both of which are very generic categories. In this study, citation analysis was defined in terms of Bernhard's definition for bibliometrics, where the principal unit(s) of measurement related to citations; conversely, *other bibliometric analysis* used the same definition, but where the principal unit(s) of measurement did not relate to citations (where there was a mix of citation and non-citation bibliometrics, *citation analysis* took precedence). *Secondary analysis* was defined narrowly as any form of method that was used to answer a research question of a previous study using the same data (i.e. pre-existing data).

Several of the other categories might be considered qualitative methods, or at least sometimes so, and so the definition of *qualitative strategy* was any strategy based on the qualitative analysis of data that did not fall into one of the other categories (excluding the *other strategy* category). Thus this strategy would correspond to the qualitative type of analysis, though would not account for the only instances of it.

Two other parts of Järvelin and Vakkari's scheme were used, to shed further light on the strategies and techniques employed in contemporary LIS research: the array of data collection techniques (which are sometimes termed *methods* in the literature), and the qualitative and quantitative categorisations under type of analysis. Essentially, the same nine categories were used to classify data collection, while a further type of analysis was added, namely, that which was *both* qualitative and quantitative. The two arrays are listed below.

Data collection technique
Questionnaire, interview
Observation
Thinking aloud
Content analysis
Citation analysis
Historical source analysis
Use of data collected earlier
Other technique
More than one technique

Type of analysis
Qualitative
Quantitative

Both

The categories in each of the three classification facets were treated as mutually exclusive for the purposes of this analysis, such that an article would be classed in only one category. Where there was clearly one primary strategy or technique, the article was classed in the corresponding category; where there was more than one primary strategy or technique, it was classed with the *mixed strategies* or *more than one technique* category. Similarly, if major parts of the analysis were quantitative, but other major parts were qualitative, the *both* category was used.

4.2. Selection of literature

It is, of course, recognised that by no means all high-quality research is reported in high-profile journals, nor do all the articles in high-profile journals necessarily represent high-quality research. Nevertheless, the assumption is made here that there is a great deal of overlap. In any case, it is worth identifying strategies and techniques used in high-profile research, even if it is not all high-quality, as such research (or the reporting of such research) is likely to influence future research directions.

Following other studies, including those of Järvelin and Vakkari, and Kumpulainen, only journal articles were examined, for practical reasons. It is assumed that the top journals in the LIS field are at least as influential as the top monographs, conference papers, reports and dissertations. It is also assumed that they are reasonably representative of current research (and probably more so than monographic literature), and that the journals selected represent a broad cross-section of LIS and related research. Järvelin and Vakkari, and Kumpulainen, selected core LIS journals, in terms of importance and relevance. This study emphasizes the criterion of importance, in the senses of impact and profile, and use, as the basis for selection, the ranked list of journals by impact factor in the 2005 Institute of Scientific Information (ISI) journal citation report for the field. All articles in 2005 issues (according to their chronological designations) of 20 of the top 30 journals were examined (there was one exception where access to the last 2005 issue of a journal could not be gained, and so the last issue from 2004 was used instead). Nine of the other ten journals were unable to be analyzed due to lack of access to the full text, while another journal (*Annual Review of Information Science & Technology*) contained only review articles. The 20 journals examined are listed in table 1.

For the analysis, the authors discounted articles that were less substantial, such as editorials, book reviews, obituaries, and brief communications. The authors also excluded from the analysis articles that were historical reprints. Of the remaining articles, those deemed not to report new empirical research were assigned to the separate category, *no empirical research.* This would include discussion papers and essays, literature reviews, theoretical papers, and articles featuring conceptual analyses, information systems design, simulations, and so forth. All other articles were assigned one category from each of the three facets in the classification scheme outlined above.

It is assumed that these articles, by virtue of appearing in these top journals, according to the ISI journal citation report, enjoy a relatively high profile. Although it has been argued that citation impact factors favour the harder sciences, whose distribution of research strategies and techniques is no doubt different to that of the softer sciences, they have been employed extensively across the broad spectrum of disciplines as indicators of quality, and given this amount of use, are perhaps even better approximations of reputation. In any case, of the 20 journals examined, at least six hail from the softer, librarianship side of the discipline. Moreover, the list overlaps significantly (despite it being for 1985) with Järvelin and Vakkari's list of core journals, which was compiled on a more qualitative basis.

Another way in which the ISI list might be somewhat biased is in its greater coverage of publications from English-speaking countries. Although this may not be viewed as a major issue for LIS departments in English-speaking countries, it is worth bearing in mind.

4.3. Reliability testing

Parallel coding was conducted by the two authors, covering all the 2005 issues of four of the journals. A formative approach was adopted, whereby the authors discussed mismatches and assessed their rate of agreement as they progressed through the initial issues. In addition to percentage agreements of well over 80%, Cohen's kappa coefficient was used to assess the level of inter-coder agreement for the third and fourth journals, representing a total of 52 articles. The coefficients were 0.895 for the strategy variable, 0.788 for the technique variable, and 0.810 for the type of analysis variable. All three scores were considered sufficiently high, particularly given the conservative nature of the kappa coefficient, for coding to proceed separately. By this time, it had also become apparent that further improvement in consistency would be curbed by some fuzziness in the strategy taxonomy, which gave rise to instances in which both authors considered that a case could be made for more than one category. This matter is discussed further in the last section of this paper. The remaining coding, across the other journals, was shared equally by the two authors. It should be noted that both authors found it necessary to access the full text of all articles in order to identify the various facets of each paper. All had abstracts, but in most cases, these were insufficient to enable accurate coding.

5. Results

The overall counts for the three facets in our classification scheme are shown in tables 2-4. For strategies, the front-runner is the survey, with almost a third of the total, with experimentation a clear second. The other strategies scored between 4 and 9%, apart from the historical research and secondary analysis, which both had very low numbers. For techniques, not surprisingly, given the popularity of the survey, the front-runner is questionnaire/interview, with about a third of the total. The only other specific technique with more than 10% is content analysis. The use of pre-existing data, other techniques, and multiple techniques all score between 14 and 17%. The relatively modest count for multiple techniques means that any difference in distribution amongst the individual techniques hidden within the coding for the *multiple techniques* category would likely have little bearing on the overall scores for particular techniques; the same may be said for *mixed strategies*. For type of analysis, about two thirds of the research was quantitative, a long way ahead of qualitative research, and research which employed both types of analysis.

The proportion of articles reporting no empirical research was 32.0% (267/834). This high figure is due to a large number of discussion papers, some theoretical papers, and some papers in the information sciences that featured modelling and simulation exercises (particularly those overlapping with computer and management sciences).

Given that the journals examined represent a wide range of fields, across the whole spectrum of LIS, and that some of these fields overlap with other disciplines (such as computer science and management science), the authors decided to compare the results from those journals which focus primarily on librarianship, with the results from those which do not. The librarianship journals were defined as those which focused primarily on topics pertaining to libraries (or a particular type of library) and were identified as: *College & Research Libraries, The Journal of the Medical Library Association, Library & Information Science Research, Library Quarterly, The Journal of Academic Librarianship,* and

Library Resources & Technical Services. The comparison is shown in tables 5-7. Interestingly, the proportion of articles reporting no empirical research in the librarianship journals was 33.0% (69/209), compared with 31.7% (198/625) in the other journals – no significant difference, despite an expectation that librarianship journals might contain more discussion papers and essays.

Finally, the overall results for 2005 were compared with those for 1985 and 1975 produced by Järvelin and Vakkari (1990), and Kumpulainen (1991). These are shown in tables 8-10. For strategies, the mixed strategies category was discounted from the 2005 analysis, as it was not employed in the earlier analyses; secondary analysis was also discounted, as its result was not shown in the earlier figures. Similarly, for type of analysis, the *both* category was omitted from the 2005 figures.

6. Discussion

6.1. Comparison of distributions

With respect to the distributions of strategies reported in the librarianship and non-librarianship journals, the degree of correlation was no more than fair, indicating that some significant differences in the research approaches adopted by librarianship researchers and other LIS researchers. There were several strategies for which the proportions differed significantly. The survey was even more prevalent in the librarianship journals, accounting for over half of the research. Conversely, there were no experiments recorded in the librarianship journals – dramatically different from the 27.6% in the other journals. Historical research and content analysis occurred a little more often in the librarianship journals, whereas non-citation forms of bibliometrics occurred less.

For the techniques, the degree of correlation between librarianship and non-librarianship was fair, but again, it could have been higher. Given the prevalence of surveys in the librarianship journals, it is not surprising that questionnaires and interviews also feature very prominently. Another notable statistic was the far greater proportion of research using data collected previously in the non-librarianship journals. This would be partly due to the use of test collections in the information retrieval field, barely covered by the librarianship journals. There were several other techniques that could not be specified in the analysis using Järvelin and Vakkari's categories, but which were often encountered, including task analysis (the often automated measurement of task accomplishments) and dataset construction for experimentation. These techniques were more often adopted by researchers publishing in the non-librarianship journals.

For type of analysis, quantitative research still accounts for over half of the librarianship journal articles, though the percentage is higher in non-librarianship journals. The proportions of qualitative research are similar (around 20%), so the lesser amount of quantitative analysis in librarianship research is compensated instead by more research which combines quantitative and qualitative analysis.

Comparing the 1975, 1985 and 2005 distributions, some trends can be observed. There is an extreme trend downwards for historical research, and also marked trends against evaluation and survey – considering our findings for the librarianship journals, the decreases in historical research and survey may well be linked, at least in part, to a decrease in the coverage of traditional librarianship concerns in the high-profile journal literature. Conversely, there is a very marked increase in experimentation, no doubt due in part to the abundance of articles in the areas of information retrieval and computer science. There are also significant increases, although from lower bases, for qualitative strategies (outside of history) and content analysis.

Somewhat surprisingly, the use of questionnaires and interviews appears to have increased, even though the survey has declined; this can be explained, however, by the rise of qualitative research, which is often conducted through interviews. The use of historical source material has, of course, declined in correspondence to the decline in the historical research.

Interestingly, overall there does not appear to have been any great shift in the proportions of quantitative and qualitative research – an increase in the use of more sophisticated qualitative research methods has been balanced by the decrease in historical research and by an increase in experimentation.

It is also worth noting that the percentage of articles not reporting empirical research was 55.9 in the 1985 analysis, compared with 32.0 in 2005. It is quite possible that the earlier study covered articles that were not examined in the later study, but the large difference here suggests that certain types of article, such as discussion and descriptive articles, may be less likely to find their way into the top LIS journals today than in previous times.

6.2. Revision of classification scheme

It should be noted that *other strategies* ranked third in the 2005 results, behind only surveys and experiments. Of the non-specified strategies, there were significant numbers of similar type, and it is proposed that a revised classification scheme includes more specific strategies and clearer definitions so as to reduce the number of *others.*

As mentioned earlier, the overlap between strategies in the scheme limits the reliability of its use. Notwithstanding the definitions that were adopted for this analysis, experiments and surveys can also be evaluations, and so on, without such cases necessarily representing a mixed methods approach: rather, an approach may simply reflect aspects of two or even three strategies. Apart from constructing tighter definitions (which is necessary), a way forward might be to establish an order of priority, but it is difficult to justify any particular order. Instead, the fuzziness of the strategy categories needs to be recognized, such that distributions resulting from content analyses based on them can only be approximate representations of the approaches researchers are employing; similarly, it should be recognized that researchers often approach a problem or question in a multi-dimensional way.

A major problem with the strategy classification is the presence of categories that really represent techniques, as reflected in their duplication in the technique taxonomy: it is thus recommended that content analysis, protocol analysis (which need not be merged with content analysis), citation analysis, and other bibliometric analysis are dropped from the list of strategies – this would also reduce the overlap problem.

The authors also do not see any need to amalgamate case study and action research: instances of case study were often quite distinct from instances of action research. It is recommended that action research forms a separate strategy category.

Another problem with the strategy classification was the use of *qualitative* as a catch-all category. It has been noted that there was significantly more qualitative analysis being carried out in 2005 than in 1985, the year for which the scheme was originally constructed. There is, in any case, no point in using a category which is defined solely on the basis of the analysis facet. Instead, it is proposed that the category be dropped, and replaced by *ethnography.* This allows for other qualitative approaches, which if not covered by the other specific strategies in the array, to be classed as *other strategy,* along with other quantitative approaches (and ones that are both quantitative and qualitative). Ethnography would usually include studies based on participant observation, journal entries, unstructured interviews, and

so on. Case study research, on the other hand, would focus on particular cases; it may or may not employ a sophisticated methodology such as grounded theory.

Finally, there seems little reason to retain *secondary analysis*, as it is not in itself a research strategy and rarely occurs. In summary, it is recommended that the strategy facet be revised as below.

Strategy
Historical research
Ethnography
Case study
Action research
Survey
Evaluation
Experimentation
Other strategy
Mixed strategies

This array coincides to varying degrees with those 'methods' covered in LIS textbooks: for example, it coincides with six out of Williamson's eight 'methods' (2002), and four out of Powell and Connaway's nine 'methods' (2004, p. 59-68). It shares only two or three of 22 'methods' in Eldredge's recent inventory (2004), but Eldredge includes some very broad 'methods', such as analysis and summing up, as well as some much narrower techniques. It may be noted that Powell and Connaway also include techniques, such as content analysis, that have been deleted from the new taxonomy recommended here.

Just as there were quite a few *other strategies* in our findings, so too was there a significant number of *other techniques*. Techniques not specifically covered, but that were sometimes reported, include transaction log analysis, focus groups, task analysis, journal entries, and bibliometric techniques outside of citation analysis; many other instances of *other technique* involved the construction of data sets for information retrieval experiments. Although citation analyses could largely be distinguished from other forms of bibliometric analysis, there seems little practical reason why they need to be categorised separately, and it is recommended that *bibliometric analysis* be made a unifying category, embracing newer forms of webliometrics, such as link analysis.

There was less of a problem with overlap between technique categories than there was for strategies. However, there were a couple of categories which encompassed fairly diverse techniques. Observation was used for certain ethnographic studies, but also for usability inspections and the like. It is proposed that instead the category *inspection* is added, which would often be undertaken by experts or users, and would often involve the use of checklists, etc. *Use of data collected earlier* often meant the use of test collections for information retrieval experiments, but there was a range of other data used. However, given the nature of the technique – to use previously collected and processed data – it does not seem necessary to break this category down any further.

In summary, it is recommended that the technique facet be revised as below.

Data collection technique
Historical source analysis
Questionnaire, interview
Focus groups
Journal entries

Observation
Inspection
Protocol analysis
Content analysis
Bibliometric analysis
Transaction log analysis
Task analysis
Dataset construction
Use of data collected earlier
Other technique
More than one technique

There appears to be no particular need to revise the type of analysis facet, beyond the revision made for this study (i.e. adding a *both* category). It should be noted that the authors' coding rarely disagreed for this facet.

6.3. Future research

There are various ways in which this content analysis can be usefully replicated. It would, of course, be interesting to see what the distributions of research strategies and techniques look like in 2015, given the changes exposed in this study. It would also be interesting to see what they look like for lower profile research and that featured in the professional literature, the latter being the kind of research more likely to be undertaken by practitioners, towards whom research methods courses in MLS programs are probably best geared. Given that one of the chief purposes of this research was to provide an indication of what courses for LIS research students need to cover, it would also be worthwhile to perform a parallel content analysis on the current course syllabi, to gauge the extent to which they are in step with current research practice.

7. Conclusion

The results of the content analysis suggest that LIS researchers who publish in the top journals today mostly rely on a couple of strategies: survey and experimentation. However, there is also a wide range of other strategies used in fairly significant numbers, demonstrating the broad church that the discipline (or group of disciplines) embodies. Qualitative approaches, including case studies and ethnography, are now well established, but quantitative techniques such as bibliometrics still figure as valuable tools of investigation. Indeed, the largely quantitative technique of transaction log analysis has grown rapidly to become a major instrument for those researching the performance of very large databases and related information retrieval issues.

It is thus recommended that coverage is given to all of the following strategies in LIS doctoral programs, as a minimum: survey, experimentation, case study, ethnography, and evaluation. This would entail the coverage of certain techniques closely associated with certain of these strategies, including questionnaires and interviews, as well as other common techniques such as content analysis, bibliometrics, and transaction log analysis.

Comparison with earlier studies indicates a discipline (or set of disciplines) that continues to evolve and utilise new approaches and techniques as they emerge. The emphasis on empirical research appears stronger than ever, as LIS seeks to cement its position in the academic community. The diversity and

sophistication of strategies and techniques currently applied by LIS researchers bodes well for the future, with a healthy mix of quantitative and qualitative approaches reflecting the many kinds of research question that LIS addresses. LIS researchers need to be keenly aware of this methodological diversity, and to build on it.

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