Using the *h*-index to measure research performance in higher education: A case study of Library and Information Science faculty in New Zealand and Australia

By

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Abstract

As academia increasingly turns to bibliometric tools to assess research impact, the question of which indicator provides the best measure of research quality is highly debated. Much emphasis has been placed on the value of the *h*-index, a new bibliometric tool proposed in 2005 which has quickly found favour in the scientific community. One of the first applications of the *h*-index was carried out by Kelly and Jennions (2006), who found a number of variables could influence the *h*-index scores of ecologists and evolutionary biologists. To test these findings, this study calculated the *h*-index scores of New Zealand and Australian researchers teaching in the field of library and information science (LIS). Publication and citation counts were generated using the Web of Science (WoS), where a number of limitations with using the database to calculate *h*-index scores were identified. We then considered the effect that gender, country of residence, institutional affiliation, and scientific age had on the *h*-index scores of LIS researchers in New Zealand and Australia. The study found a positive relationship between scientific age and *h*-index scores, indicating that the length of a scientist's career should be considered when using the *h*-index. However, analysis also showed that gender, country of residence, and institutional affiliation had no influence on *h*-index scores.

Keywords:

Bibliometrics, Citation Analysis, h-index, Research Performance, Library and Information Science

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Introduction

1.1 Rationale for the Study

Until recently, peer-review has been the primary means by which policymakers and institutions have made decisions regarding the allocation of research funds (Pendlebury, 2009). However, the size and specialised nature of research today, and the recognised bias in peer review, has made it increasingly difficult for a small number of experts to fairly judge research quality (Pendlebury, 2009). In most OECD countries, there has also been a growing emphasis "on the effectiveness and efficiency of government-supported research" (Moed, 2009, p. 13). In light of these developments, many countries have turned to bibliometric indicators to rank both individual researchers and their institutions on a more 'rational footing' (Pendlebury, 2009). In Australia for example, the Excellence in Research for Australia (ERA) initiative intends to assess performance using discipline-specific indicators, including citation analysis (Australian Research Council, 2008). Citation analyses have also been used by the Ministry of Education (2007a) and the Ministry of Research, Science and Technology (2006a; 2006b) to measure performance at New Zealand based research institutions. This reflects a greater acceptance of citations as a 'proxy measure of quality' in this part of the world, and aligns New Zealand and Australia with overseas ranking systems that rely heavily on citation data (Ministry of Education, 2007b).

However, a number of weaknesses with the use of bibliometrics in research evaluation have also been identified, and questions remain over the validity of using such indicators. Critics argue that citation counts are the 'function of many variables', and therefore cannot be interpreted as an accurate measure of scientific impact (Bornmann & Daniel, 2008). There are also questions surrounding the shortcomings of bibliometric research design, including the limits of database coverage, bias in favour of established researchers, and the problem of self-citation. The most widely used tool for determining publication quality for example, the journal Impact Factor (IF), has attracted criticism and even 'ridicule' for the way it is calculated (Bornmann & Daniel, 2009).

As a result, Moed (2009) has argued bibliometric indicators should only be considered useful tools in research evaluation if they are 'accurate, sophisticated, and up-to-date'. They should also be combined with 'expert knowledge' and 'interpreted with care' (Moed, 2009), and any caveats associated with their use understood. Given the consequences for the use of such measures for individuals, research programmes, and institutions, the relative advantages and disadvantages of new bibliometric indicators also need be considered. One such measure is the *h*-index.

The *h*-index was proposed by Jorge Hirsch in 2005 as a new bibliometric indicator for quantifying the scientific output of individual researchers. Hirsch (2005) writes that "a scientist has index h if h of his N_p papers have at least h citations each, and the other $(N_p - h)$ papers have at most h citations each" (p. 16569). This means, for example, that a researcher has an *h*-index of 30 if he has at least 30 papers, each of which have been cited 30 times. In addition, Hirsch (2005) compares researchers of different scientific age by dividing h by an individual's scientific age to generate the value m. Hirsch (2005) suggests the advantage of the *h*-index over other citation-based indices is that it considers both the number and quality of publications produced. When compared with straight paper or citation counts, for example, Hirsch (2005) argues this approach provides a better estimate of the broad impact of a scientist's cumulative research contribution. The theoretical part of Hirsch's idea seems to have been well received, and several refinements or complementary indexes to h have since emerged (see for example Batista, Campiteli & Kinouchi (2005); Egghe, (2006)). At the time of writing, Hirsch's paper has been cited over 180 times in the last two years, suggesting it has already been widely embraced by the academic community.

One of the first applications of the *h*-index was by Kelly and Jennions (2006) in the field of ecology and evolutionary biology. Their paper not only calculated the *h*-index scores of researchers, but considered whether a number of variables would influence h values (Kelly & Jennions, 2006). They found that scientific age, gender, and country of residence were factors which could have a significant impact on the *h*-index scores of some researchers (Kelly & Jennions, 2006). Kelly and Jennions (2006, 2007) suggest their findings are unlikely to be restricted to the field of ecology and evolutionary biology, and thus caution against the use of the *h*-index for evaluative purposes. This assertion remains untested however because no authors have replicated the study by Kelly and Jennions (2006) and considered the effect of these variables on *h*-index scores. Most notably, there are no examples from LIS, despite applications of the *h*-index by Cronin and Meho (2006), Oppenheim (2007) and Sanderson (2008). As a result, a substantial gap in the literature exists, and the extent to which the variables identified by Kelly and Jennions (2006) might influence *h*-index scores in other disciplines remains unclear. This situation is particularly problematic if the *h*-index is to emerge as the favoured bibliometric measure for assessing individual researchers.

1.2 Research Objectives

The objective of this study is to test the claims made by Kelly and Jennions (2006) and establish whether the *h*-index represents a suitable measure of research performance in LIS. In order to do this, it will consider the effect gender, country of residence, institutional affiliation, and scientific age have on the *h*-index scores of LIS researchers in New Zealand and Australia. Three of these variables (scientific age, gender, and country of residence) were identified by Kelly and Jennions (2006) as influencing the *h*-index scores of ecologists and evolutionary biologists. A decision to include institution for consideration is based on evidence from the literature which suggests individual departments may also influence research performance.

1.3 Research Hypotheses

H_o: There is no statistically significant difference between the *h*-index scores of male and female LIS researchers in New Zealand and Australia

H_o: There is no statistically significant difference between the *h*-index scores of LIS researchers in New Zealand and LIS researchers in Australia

H_o: The institutional affiliation of New Zealand and Australian LIS researchers has no statistically significant effect on their *h*-index scores

H_o: There is no statistically significant relationship between scientific age and the *h*-index scores of LIS researchers in New Zealand and Australia

1.4 Theoretical Framework

The framework for this study is citation analysis. Citation analysis is a technique from the field of bibliometrics, which encompasses the measurement of 'properties of documents, and of document-related processes' (Borgman & Furner, 2002). The emergence of bibliometrics as a field of study was made possible by the development of the Science Citation Index (SCI) by Eugene Garfield, a database of the references made by authors to earlier articles (Thelwell, 2008). This provided the means for generating a new range of bibliometric statistics, including aggregated publication and citation counts for individual authors. Since then evaluative bibliometric techniques have emerged as a way of assessing the impact of scholarly work and in comparing the contributions of two or more individuals or groups (Thelwell, 2008). These methods seek to measure both the quantity of information a researcher communicates, as well as the quality of the information being communicated (Meadows, 1998). Evaluative bibliometrics utilise quantitative and statistical analysis and use 'references in papers and citations to them' to consider the impact of scholarly output.

Citation analysis is one such evaluative bibliometric technique, and it is commonly used to determine the impact of institutions, university departments, and individuals (Campanario, 2003). The use of citation analysis in research evaluation makes the assumption that scientists want to communicate their findings and do so through publication in the international serial literature (van Raan, 2004). It also accepts the premise that citations are the principal way researchers acknowledge others and recognise the value, quality and impact of their work (Moed, 2005). Core citation-based impact measures include simple, single-number metrics that count the total number of citations an author receives, or indicate the average number of citations received per paper. Citation analysis provides the framework for using the *h*-index in this study because the *h*-index is based on the distribution of citations received by a given researcher's publications. As the *h*-index is a citation-based metric, citation analysis also indicates the validity of using the *h*-index to measure the performance of LIS researchers in New Zealand and Australia.

1.5 Definition of Terms

Bibliometrics: "The definition and purpose of bibliometrics is to shed light on the process of written communications and of the nature and course of the discipline… by means of counting and analysing the various facets of written communication" (Pritchard, 1969, p. 348).

Citation Analysis: "The construction and application of a series of indicators of the 'impact', 'influence' or 'quality' of scholarly work, derived from citation data" (Moed, 2005, p. ix).

***h*-index**: An indicator for quantifying the impact of individual researchers: "a scientist has index h if h of his N_p papers have at least h citations each, and the other (N_p - h) papers have at most h citations each" (Hirsch, 2005, p. 16569).

Research Active: A 'research active' individual is someone who pursues research on an ongoing basis, as a major focus of their academic activity.

Scientific Age: The number of years in which a researcher has been in academia and has been actively publishing – calculated as "the time elapsed since [a scientist's] first published paper till the present" (Hirsch, 2005, p. 16571).

1.6 Delimitations/Limitations

1.6.1 Delimitations

- The study is confined to currently research active New Zealand and Australian LIS academics[1].

1.6.2 Limitations

- The study employs a purposive sampling technique that excludes New Zealand and Australian LIS researchers who are not identified as research active.

[1] These individuals will be teaching in a programme that is currently recognised, or is awaiting final recognition, from the Australian Library and Information Association (ALIA), or Library and Information Association of New Zealand (LIANZA,) or be identified by the study as actively publishing in the LIS field in New Zealand or Australia. In addition, they will have been indexed in the Web of Science (WoS) database.

- The study will calculate the *h*-index scores of researchers using the WoS database and there are some recognised disadvantages with its use (see Section 3.3).

2

Literature Review

The *h*-index was introduced by Jorge Hirsch in 2005 – first as a preprint in arXiv.org, and later as a published paper in the *Proceedings of the National Academy of the Sciences.* It has since raised considerable interest within academia, and a number of studies have used the *h*-index to rank the research performance of individuals. Hirsch himself applied the *h*-index to a number of prominent physicists and biologists, and subsequently suggested 'target' *h*-index scores which would indicate success in each field. This was followed by studies which calculated the *h*-index scores of Derek J. de Solla Prize Medalists (Glanzel & Persson, 2005) and Nobel Prize recipients (Garfield, 2006). Other *h*-index applications have been conducted using information scientists (Cronin & Meho, 2006; Oppenheim, 2007; Sanderson, 2008), highly-cited researchers (Bar-Ilan, 2007), and 'non-prominent' physicists (Schreiber, 2007). While Hirsch (2005) proposed the *h*-index for measuring research performance at the micro level, other authors have argued the 'research group' should be the basic unit for computing *h* (van Raan, 2006; Moed, 2005). Van Raan (2006), for instance, has calculated the *h*-index for university research groups in the field of chemistry and chemical engineering in the Netherlands. There has also been much written about the use of reference-enhanced databases for computing *h* (see for example, Bar-Ilan (2007) and Jacso, (2007))[2].

Much of the literature on the *h*-index has also focused on the 'convergent validity of the *h*-index', or the way in which it relates to other bibliometric measures and peer review. In general, these studies have confirmed a positive correlation between the *h*-index and standard bibliometric indicators such as publication and citation counts. For example, the studies by Cronin and Meho (2006) and Kelly and Jennions (2006) show raw citation counts and total publication output to be comparable with *h*-index scores respectively. Bornmann and Daniel (2005) and van Raan (2006) also provide evidence which suggests the *h*-index relates well with

[2] See Section 3.3 for further discussion.

the results of peer assessment, at least in the biomedical sciences and chemistry fields. Other strengths of the *h*-index are seen as the fact it combines publication counts with citation impact and provides a good measure of 'durable' performance (Glanzel, 2006a). Glanzel (2006b) also suggests the *h*-index represents a 'robust cumulative indicator' and has potential when applied "to small paper sets where other traditional bibliometric indicators often fail" (p. 320). While these findings suggest the *h*-index is a useful indictor of research performance, Bornmann and Daniel (2007) argue there has been no thorough validation of the *h*-index. As such, they believe the *h*-index should not yet be used for evaluative purposes (Bornmann & Daniel, 2007).

Further caution in the use of the *h*-index is advocated by authors such as Glanzel (2006a; 2006b) and van Raan (2006), despite the many advantages of the *h*-index they identify. This concern is mainly related to the validity of using a single-number index to measure research performance. Like Costas and Bordons (2007), they believe a multifaceted approach (that includes advanced bibliometric indicators and peer review) is necessary in order to properly assess scientists. Questions have also been raised by Lehmann, Jackson and Lautrup (2006) in regards to the accuracy of the *h*-index as a measure of research performance. Using Bayesian statistics to quantify the reliability of 'one-dimensional indicators of research quality', they conclude the *h*-index lacks the necessary precision to be useful. In addition, Kelly and Jennions (2006) and van Leeuwen (2008) have warned the *h*-index is strongly field dependent, due to the diversity of publication and citation patterns across disciplines. Logically, younger researchers and those who publish less are also known to be at a disadvantage, given the number of papers published represents the maximum *h*-index an individual can obtain (Costas & Bordons, 2007; Kelly & Jennions, 2006; van Leeuwen, 2008). These observations have led van Leeuwen (2008) to write of the 'dangers' in applying the *h*-index, especially for research assessment purposes.

Problems with the *h*-index have led to what Meyer (2009) has dubbed 'index science' – a new field concerned with building variants of the *h*-index. Hirsch (2005) himself suggested the *m* quotient, calculated by dividing an individual's *h*-index score by the number of years since their first published paper (Hirsch, 2005). Like the *h*-index sequence, the *h*-rate, and the *AR*-index, which have also been proposed recently, the *m* quotient attempts to avoid the time dependent nature of the *h*-index. The *AR*-index, for example, was devised so that scientists who had stopped publishing, and whose *h* would otherwise remain constant, were not favoured over currently active researchers (Jin, 2007). Another index, h_1, was proposed to reduce bias towards individuals who frequently publish as co-authors (Batista et al., 2006), while h_2 excludes self-citations and avoids favouring authors who cite their own work (Schreider (2007). *IQp,* devised by Antonakis and Lalive (2008), corrects for both different fields of science and for scientific age, so that researchers from different disciplines can be compared. However, of the various indices put forward in recent years, only the *g* index has received significant attention from the scientific community. The *g* index is meant to give more weight to highly cited papers, and there is some debate as to whether *h* or *g* should be preferred (see for example, Burrell (2009)).

Less has been written, however, about the effect a number of factors might have on *h*-index scores. Of the aforementioned studies, only Kelly and Jennions (2006) – in their study of ecologists and evolutionary biologists – considered whether a number of variables would influence *h* values. They showed that mean *h*-index scores varied between subject areas, supporting the assertion that *h* is field dependent due to differences in citation and/or publication rates. Their analysis also demonstrated a linear relationship between *h* and scientific age, confirming that *h* is only suitable when comparing researchers who have been publishing for the same number of years. In addition, Kelly and Jennions (2006) found female ecologists and evolutionary biologists had significantly lower *h*-index scores than their male counterparts. They hypothesised this was due to females in their sample publishing fewer papers than the males – and after controlling for this, found no gender difference in *m* values. Finally, their study showed that country of residence influenced *h*-index scores, with the mean *m* score higher for UK and EU residents than those in Canada, the US, and remaining countries. Like van Leeuwan (2008), Kelly and Jennions (2006, 2007) subsequently caution against the use of the *h*-index for evaluative purposes, particularly because of the effect of age and gender on *h.*

The study by Mugnaini, Packer and Meneghini (2008), in which the *h*-index scores of scientists from Brazil and the US were compared, shows similar results to those of Kelly and Jennions (2006). Specifically, they found differences in median *h*-index scores across the ten subject areas they considered, as well as higher median *h*-index scores for researchers in the US. However Mugnaini et al. (2008) do not test gender or age as possible influences on *h,* meaning the paper by Kelly and Jennions (2006) is the only comprehensive study of its type in any discipline. Even in the field of LIS, from which there is a number of *h*-index applications, there are no examples.

Oppenheim (2007) for instance notes the top-ranked researchers in his study of UK LIS academics were "in the more technical aspect of the subject" (p. 300) but fails to comment further. A comparison with the study by Cronin and Meho (2006) – who applied the *h*-index to LIS researchers in the US – is also discussed, but deemed inappropriate due to differences in methodology. Oppenheim (2007) however does introduce a fifth variable not considered by Kelly and Jennions (2006), teaching institution, and notes the distribution of the top-ranking scholars in his study by university. In contrast, the third application from LIS, that of Sanderson (2008), focuses on the effect of database selection on *h*-index scores.

The findings from Kelly and Jennions (2006) are supported in the literature by a body of work that reports on the determinants of research performance. These studies tend to focus on variables which influence research productivity, but evidence suggests a good correlation "between the amount researchers publish and the quality of their work" (Meadows, 1998, p. 93). For instance, evidence suggests that in general, women produce 40-50% less than their male counterparts (Meadows, 1998). This holds true across different subjects, institutions, and countries, and numerous explanations for the gender gap in research productivity have been put forward (Stack, 2004). As a result of the strong link between being a 'high producer and visibility as a researcher', women have also been found to receive fewer citations to their work, particularly at the more productive end (Meadows, 1998). As an example, Ferber (1988) and Davenport and Synder (1995), have shown that in proportion to their relative numbers, women are under-cited as researchers in the fields of both economics and sociology. In New Zealand, this situation is reflected in the quality evaluation scores achieved by men and women in the Performance-Based Research Fund (PBRF). For the 2006 round, women attained an average score of 1.75, compared with the average male score of 3.21 (Curtis & Phibbs, 2006).

In an attempt to explain this gender difference, some studies have considered the correlation between the productivity of women and university departments. This is because the importance of institutional affiliation on research quality is well established, particularly in the US where the differences among universities have always been large (Meadows, 1998). A study of the elite and lower ranked universities in the UK has also confirmed institutional affiliation is an important explanatory factor on research productivity (Meadows, 1998). The influence is such that the National Research Council (2001) found the productivity gap between men and women scientists fell by 10% when only individuals from the same type of institution were compared. As the study noted, “the effect of a scientist’s institutional affiliation… is so great that the prestige of the university has been found to affect scientists’ productivity, rather than the other way around” (2001, p. 123). Studies from the US also indicate that researchers at more ‘prestigious’ university departments are cited more often than colleagues at lower-ranked institutions (Carayol & Matt, 2006). Reasons for this difference have been attributed to the level of financial and physical resources, intellectual stimulation, and collegial expectations and rewards, that a university department offers (Allison & Long, 1990).

The productivity of individuals is also known to vary by country, with researchers in developing nations producing fewer papers than those in leading research countries (Meadows, 1998). As Meadows (1998) has noted, the number of researchers in developing countries may be increasing, but ‘problems relating to recognition remain’. Not only are these researchers less productive, they often receive fewer citations to their work (Mishra, 2008). Mishra (2008) has argued this is because researchers in developing countries are “required to publish in national journals that rarely find a place among cited journals, and have a very limited circulation abroad” (p. 244). Deficiencies in material resources, limitations imposed by bureaucracy, and a lack of formal communication are also cited as reasons for why differences exist (Meadows, 1998). It is also common for Western countries to complete international benchmarking, and the literature is ‘abundant’ with studies comparing the accomplishments of nations (Mugnaini et al., 2008). As an example, analysis has shown that in the field of biomedical research for the decade ending 2004, the productivity of EU countries was just 76% of that of the US (Soteriades & Falagas, 2004). In this part of the world, the Ministry of Education (2007a) has also shown Australia outperforms New Zealand in terms of research impact.

Finally, because analyses of impact are usually calculated using total publication or citation counts, age is known to affect an individual’s measure of research performance. For example, if the total number of papers is being considered, then younger researchers who have published fewer papers are known to be at a disadvantage. Logically, a researcher’s pool of published papers, and the citations to those papers, will increase over time, meaning researchers of different ages cannot be reliably compared. In addition, there is also evidence that productivity varies over a researcher’s lifetime, and that individuals may reach a ‘publishing peak’ after which their rate of publication declines (Meadows, 1998). When this peak occurs is thought to be field dependent; for researchers in the more 'fundamental disciplines' it tends to be in the thirties, while in the humanities it may be the forties or some years later still (Meadows, 1998; Carayol & Matt, 2006). Levin and Stephen (1991) studied the relationship between age and the research productivity PhD scientists in six separate fields and were able to identify these 'life-cycle aging effects'. They concluded that for five of the six disciplines they examined, there was evidence that scientists become less productive as they age (Levin & Stephen, 1991).

In examining whether these findings hold for LIS researchers, studies from the field show similar, though sometimes inconsistent, results. For instance, findings from Korytnyk (1988) and Penas and Willet (2006) show that male LIS academics are more productive than their female counterparts. However, both studies also indicate there is no significant difference between men and women in terms of the number of citations received, making it difficult to conclude if gender affects research performance in LIS. Unfortunately, studies which consider the institutional and geographic distribution of authors in LIS publishing (such as Buttlar (1991), Raptis (1992) and Siddiqui (1997)) only provide limited analysis. That is, they provide straight publication counts for faculty and fail to consider either the productivity or quality of individual researchers. As an example, Siddiqui (1997) examined the institutional affiliation of authors published in four international information science journals, but did not consider whether there was a statistically significant difference in their productivity. There also appears to be no studies which analyse the age of researchers, making it unclear how any these three variables might influence research performance in LIS. This indicates there may be a gap in our understanding regarding the performance of LIS researchers across a number of different factors.

In conclusion, while the literature suggests the *h*-index has advantages over traditional bibliometric measures of research performance, questions over its use remain. Just as the legitimacy of other single number citation-based indices is queried, authors stress the importance of using the *h*-index only alongside other (more advanced) bibliometric indicators and peer review. However, due to the supposed advantages of the *h*-index and the ease in which it can be calculated, it has quickly found favour within the academic community (Jacso, 2008a). If the *h*-index is to emerge as the preferred bibliometric measure in research assessment, a cross-discipline validation of the *h*-index (as recommended by Bornmann and

Daniel (2007)) is important. In particular, there is evidence from the literature to suggest that several variables can influence those two factors measured by the *h*-index – the productivity of researchers as well as the number of citations they receive. In support of this, Kelly and Jennions (2006) have found that scientific age, gender and country of residence are factors which could have a significant impact on the *h*-index scores of some researchers. Their study however has not been repeated in another field (including LIS), leaving their findings untested, and a substantial gap in the literature. The contribution of this study will therefore be significant, and will add to the growing body of work on the *h*-index.

3

Research Design

3.1 Research Sample

The study was carried out on 35 research active New Zealand and Australian-based academics from the field of LIS. Individuals in Australia were all teaching in LIS postgraduate programmes which were either currently recognised, or were awaiting final approval for recognition, by ALIA (R. Ellard, personal communication, March 3, 2009). Staff from the University of Technology Sydney had to be excluded as they were used in an earlier pilot, while University of Tasmania staff members were ignored for being primarily IS and not LIS lecturers (L. Ellis, personal communication, March 26, 2009). This meant the list was drawn from Charles Sturt University, Curtin University of Technology, Edith Cowan University, Monash University, Queensland University of Technology, RMIT University and the University of South Australia. New Zealand academics were based at the only postgraduate LIS programme in the country (Victoria University of Wellington), which is awaiting final recognition by LIANZA. The majority of researchers were identified from departmental websites; however in a few cases it was necessary to contact the Head of Department directly for this information. Only those individuals who held the position of Lecturer or above were selected for inclusion in the sample, while researchers from the field of Teacher Librarianship were excluded. At the conclusion of this process, a list of 62 academics had been made.

In order to ensure the New Zealand and Australian LIS population was fairly represented, the study included one other academic teaching outside one of the aforementioned programmes. Based on our personal domain knowledge, this individual was identified as an 'influential' LIS researcher believed to be actively publishing in the field. It was then considered necessary to limit the sample to those academics that had 'the level of citation impact' needed to generate their *h*-index score. In previous applications of the *h*-index in LIS, this has been achieved through selecting 'Senior' researchers (Oppenheim, 2007), or using personal knowledge of the field to identify 'influential' individuals (Cronin & Meho, 2006). This study employed a new method, however, and targeted those academics that had been published in at least one of the journals indexed by the WoS database. As WoS only indexes peer-reviewed, high-impact journals, it was believed that researchers indexed in the database would provide 'information rich cases'. The fact that WoS is recognised as the standard tool for generating citation information, and is widely used for research and assessment purposes (Meho & Yang, 2007) provided further support for this approach. This step eliminated 19 researchers from the initial list, bringing the number to 41.

Finally, a few individuals with common names had to be eliminated from the sample due to the difficulties associated with calculating their *h*-index scores. Software limitations mean that crediting authors with the correct citations is a particularly daunting task, even for those researchers whose last name is more unusual (Jacso, 2007). As the study intended to use the 'Cited Reference Search' facility available through WoS (identified by Jacso (2008b; 2008c) and Bar-Ilan (2008) as an 'arduous' and 'time-consuming' process) this issue was compounded (note that WoS has two different tools designed to provide better disambiguation of authors, but these features are only available when conducting a 'General Search'). Testing was carried out to gauge the extent of this problem for the individuals in the sample whom we considered had extremely common last names. This saw six academics from the list (whose names resulted in several thousand hits when searched through WoS) being excluded from further analysis. While this process (which bought the final sample to 35 individuals) can be critiqued, it is an approach deemed necessary by other authors as well (such as Bar-Ilan, 2008). In addition, the scope of the study meant the time committed to data collection had to be restricted, and calculating the *h*-index scores of these six academics was not considered feasible.

It should be noted that we would have liked to use the parameters set by the New Zealand PBRF when selecting the research sample. The PBRF only considers staff who meet certain eligibility guidelines, and following these would have allowed the study to better mirror a 'real-life' assessment exercise. PBRF criterion requires academics to have a major role in teaching at least one degree level course or be making a contribution to research 'in which they are likely to be named as an author'. They must also be employed at the institution in question on a salaried employment agreement which is for at least one year in duration, and work a minium of one day a week on average. In addition, the PBRF counts staff members who have moved in the last 12 months for both institutions, according to the 'relevant proportion of their contribution on a 'FTE basis'. If it were possible to follow the PBRF guidelines, the sampling method outlined above (particularly the need to consult WoS in order to identify 'research active' individuals) would be unnecessary. If an individual had recently transferred between institutions, direction could also be taken on where their research contribution was more fairly represented. However, to determine their employment conditions and history, academics would need to be contacted directly, and such a process was not considered feasible due to the scope of the study.

3.2 Identifying Variables

The variables which were being considered were identified at the time the sample was selected and recorded in an Excel spreadsheet next to the researcher's name. Based on the university department where academics were faculty members, country of residence and institutional affiliation were apparent. As indicated above, no attempt was made to establish how long researchers had been employed by the department in question, so results relating to this variable can only be considered indicative. For the majority of researchers their name pointed to their gender, while in a small number of cases other identifying information (such as a photo on the departmental webpage) was required to make the distinction. The decision was made to consider the scientific age of researchers, as opposed to their chronological age, because this took into account a researcher's time in academia. For the purposes of the study, scientific age was defined as 'the difference in years between the current date and the year a researcher's first paper was published'. To calculate scientific age, a researcher's earliest published paper (cited or not) was identified from either the WoS 'General' or 'Cited Reference' search on their name (see Section 3.4: Specific Procedures). The year when this paper was published was then subtracted from 2009 (meaning, for example, that a researcher who published their first paper in 1991, was recorded as having a scientific age of 18).

3.3 Database Selection

The *h*-index scores of the 35 target individuals were calculated in March 2009 using the 'Cited Reference Search' facility provided through WoS. It is important to note that WoS is available in many different versions, and that the edition used can "significantly influence the *h*-index of the subjects evaluated" (Jacso, 2008b, p. 674). This study consulted the WoS Century edition, where the Science Citation Index covers the period 1900-2009, the Social Sciences Citation Index 1956-2009, and the Arts & Humanities Citation Index 1975-2009. It is interesting that in previous *h*-index applications in LIS, citation data was generated using much shorter time frames – Oppenheim (2007) for example only searched 1992-2005. Although variations exist in the different WoS editions, few authors report the version consulted when calculating *h*-index scores (Jacso, 2008c) – or justify their choice of WoS over other cited-reference enhanced databases. This is despite the fact several authors have noted that database choice can have a significant impact on the publication and citation counts of individual researchers (Meho & Spurgin, 2005; Meho & Yang, 2007). More recently, Jacso (2008a) and Bar-Ilan (2008) have also documented the effect factors such as database composition and retrospectivity can have on *h*-index scores. Before continuing, it is therefore worth considering the benefits of using WoS in this study.

WoS provides access to a "wide variety of multidisciplinary, multipublisher and geographically diverse [information] sources" (Bedeian, 2009, p. 216). It indexes the majority of the world's prominent, peer-reviewed journals, and has gained international acceptance as the 'gold standard' of databases (Martin, 2007). Authors such as Dess (2006) and Jacso (2008b) have also argued that only WoS is appropriate for calculating *h*-index scores because it offers the greatest depth of coverage. This is due to the fact that unlike other databases, WoS includes the cited references for every record created, irrespective of year (this is compared with Scopus, for example, which only includes this information for papers published post 1996). WoS can also be considered superior to Google Scholar (the other database suitable for use in this study) because of its functionality and sophistication (Norris & Oppenheim, 2007). Given these features, Jacso (2008c) has gone so far as to state that "WoS is the only database that can… evaluate accomplished researchers through cited enhanced records" (p. 802). In terms of this study, the other advantage of using WoS is the fact its coverage of Library and Information Science titles is known to be better than both Scopus and Google Scholar. As WoS was used to select the research sample, it would also be counter-productive to use another database to calculate *h*-index scores.

Despite WoS having proved itself in the natural sciences, the literature does suggest there are good alternatives for calculating *h*-index scores in the social sciences and humanities. This is because the source coverage in both Scopus and Google Scholar is known to be wider, resulting in better reporting of conference proceedings and citations to books. Books in particular, are "one of the most important means to spread knowledge in the humanities and social sciences" (Baneyx, 2008, p. 364), but are not well indexed in WoS. The use of WoS could therefore be seen as 'prejudicial' to researchers in these fields – however as the intention of this study is not to compare results with those from other disciplines, it is largely a moot point. Other potential disadvantages with using WoS include a known bias towards North American, Western European, and English language journal titles (Meho & Yang, 2007). WoS databases may also contain citing errors, be inconsistent in the use of initials and non-English names (Meho & Yang, 2007) and have many 'orphan' and 'stray' references[3] (Jacso, 2008b). However, as Meho and Yang (2007) point out, these errors often originate in the original documents, and such errors are problematic in other citation databases as well. Therefore we are of the opinion that the aforementioned advantages of using WoS outweigh any possible problems.

3.4 Specific Procedures

To calculate *h*-index scores, the study took data from a WoS 'General Search' and augmented this with additional items and citations found through the WoS 'Cited Reference Search'. This is in contrast to the majority of *h*-index studies which have been conducted, as they have relied on results from a 'General Search' only (Bar-Ilan, 2008). The benefit of calculating *h*-index scores this way is ease: publications are sorted by 'times cited' and the researcher "scrolls down… until the rank of the paper is greater than the number of citations it has… the preceding rank equals *h*" (Kelly & Jennions, 2006, p. 167). However the major disadvantage of a 'General Search' is that it will only show citation counts for items indexed by WoS and will ignore citations to items that 'do not exactly match' (Bar-Ilan, 2008). Only more complete citation data can be achieved through consulting a 'Cited Reference Search' (as Cronin and Meho (2006) and Oppenheim (2007) did in their applications of the *h*-index). Jacso (2008c) also advocates calculating *h*-index scores this way because it allows 'orphan' and 'stray' references to be found. In his estimate, these references may represent between 10-12% of the matching references in WoS, and

[3] 'Orphan' references are citations which have no master record in WoS; 'stray' references are citations which differ from the key bibliometric element(s) in the master record (Jacso, 2008b).

insome cases significantly change h-index scores (Jacso, 2008b). This is supported by findings from Cronin and Meho (2006), who found a 'Cited Reference Search' generated *h*-index scores that were on average 23% higher.

Carrying out a 'General Search' through WoS allowed an individual's core works and their citations to be identified. Although the most common names had already been excluded from the research sample, in a few cases the WoS 'Author Finder' module was used to focus the search and eliminate erroneous 'hits'. The results screen was then sorted using the 'Times Cited' option in order to avoid browsing publications which had never been cited and would therefore not contribute to an individual's *h*-index score. At this stage the majority of items were journal articles and conference proceedings; later, citations for all document types (such as books, doctoral theses, and editorials) were also included. Where an article was co-authored, citation counts were given in full to each author – regardless of the number of co-authors and irrespective of whether they were the first-named author or not. This strategy was also used by Oppenheim (2007), based on the fact patterns of authorship vary greatly and that 'first authors' cannot be guaranteed to be 'senior'. Likewise, the study made no effort to exclude self-citations. While removing self-citations may invariably change an author's *h*-index, Cronin and Meho (2006) have shown that the elimination of self-citations has little influence on the ranking of information scientists.

During this process, the author built up knowledge of the LIS field and gained a good understanding of the research interests of the academics in the sample. This proved valuable during the second stage – the 'Cited Reference' searches – because it was often necessary to check the abstract of the citing article to ensure it was a reference to the target individual (see Figure 1). Unlike previous applications of the *h*-index in the field of LIS, this study counted publications and citations for all an author's works, even if these fell outside the LIS discipline. This was due in part to the difficulties associated with trying to distinguish 'pure' information science and librarianship items from those in other fields, such as computer science. In many cases during the 'Cited Reference' searches it was also necessary to collate multiple entries which all related to the same cited item (see Figure 2). This was caused by differences in the way references had been recorded (for example, with or without an author's middle initial, or with missing volume and page information). Other problems encountered were due to citing and indexing errors, meaning it was not possible to determine where a citation belonged (see Figure 3). In this case, either an online bibliography of the author's publications was utilised, or the full text of the citing article was accessed so the original reference list could be consulted.

Select All* Clear All

arch

Cited Work [SHOW ABBREVIATED TITLES]	Year	Volume	Page	Article ID	Citing Articles **
1 MONDAY	2001				1
1 MONDAY	2001	6			4
1 MONDAY	2001	6	4		1
12TH NATIONAL ONLINE MEETING : PROCEEDINGS 1991 Title: THE AUSTRALIAN ONLINE INFORMATION INDUSTRY - A BRIEF-HISTORY	1991		353		1
13TH NATIONAL ONLINE MEETING : PROCEEDINGS - 1992 Title: WHERE DO THE SEARCH TERMS COME FROM	1992		363		1
13TH P ANN NAT ONL M	1993	14			1
13TH P ANN NAT ONL M	1992	13	363		4
14TH P NAT ONL M	1993	14	387		1
17 ANN INT ACM SIG C	1994		81		2
17TH P INT C RES DEV	1994				1
19TH ANNUAL NATIONAL ONLINE MEETING, PROCEEDINGS-1998 Title: Users' searching behavior on the EXCITE Web search engine	1998		375		1
5 EURO INFORMS JOINT	2003				1
55TH P ANN M AM SOC	1992	28	249		1
56TH P ANN M AM SOC	1993	30			1
56TH P ANN M AM SOC	1993	29			1
57TH ANN M AM SOC IN	1994				1
ACM SIGIR 2004 WORKS	2004		16		1
ACM SIGIR FOR	2003	36			1

Figure 1: 'Cryptic' abbreviations (particularly of conference proceedings) make it necessary to check the abstract of the citing article to ensure it is a reference to the target individual.

Select All* Clear All

arch

Cited Work [SHOW ABBREVIATED TITLES]	Year	Volume	Page	Article ID	Citing Articles **
1 MONDAY	2001				1
1 MONDAY	2001	6			4
1 MONDAY	2001	6	4		1
12TH NATIONAL ONLINE MEETING : PROCEEDINGS 1991 Title: THE AUSTRALIAN ONLINE INFORMATION INDUSTRY - A BRIEF-HISTORY	1991		353		1
13TH NATIONAL ONLINE MEETING : PROCEEDINGS - 1992 Title: WHERE DO THE SEARCH TERMS COME FROM	1992		363		1
13TH P ANN NAT ONL M	1993	14			1
13TH P ANN NAT ONL M	1992	13	363		4
14TH P NAT ONL M	1993	14	387		1
17 ANN INT ACM SIG C	1994		81		2
17TH P INT C RES DEV	1994				1
19TH ANNUAL NATIONAL ONLINE MEETING, PROCEEDINGS-1998 Title: Users' searching behavior on the EXCITE Web search engine	1998		375		1
5 EURO INFORMS JOINT	2003				1
55TH P ANN M AM SOC	1992	28	249		1
56TH P ANN M AM SOC	1993	30			1
56TH P ANN M AM SOC	1993	29			1
57TH ANN M AM SOC IN	1994				1
ACM SIGIR 2004 WORKS	2004		16		1
ACM SIGIR FOR	2003	36			1

Figure 2: In this case the author's online bibliography had to be consulted to confirm they only published one article in this journal during 2001; the three cited reference variants could then be collated.

HBES 2002 P INT C HU	2002				1
HIGHLY RELEVANT NOT	1998				1
HLTH INFO LIB J	2004	21	44		4
HUMAN COMPUTER INTER			249		1
HYDROBIOLOGIA Title: The effects of a record flood on the aquatic vegetation of the Upper Mississippi River System: Some preliminary findings	1996	340	51		13
ICKM	2004	6			1
INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY: CODING AND COMPUTING, PROCEEDINGS Title: Multimedia Web queries: Implications for design	2001		589		1
IEEE COMPUT	2002	55	107		1
IEEE COMPUT	2002	35	107		60
IEEE COMPUT	2002	35	133		24
IEEE COMPUTER					1
IEEE COMPUTER	2002	35			1
IEEE CP	2004	2	309		1
IEEE ITCC 04 INT C C	2004				2
ITCC 2004: INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY: CODING AND COMPUTING, VOL 1, PROCEEDINGS Title: Multitasking Web search on Alta Vista	2004		309		1
IEEE JOURNAL OF SOLID-STATE CIRCUITS Title: A low-cost, 300-MHz, RISC CPU with attached media processor	1998	33	1829		15
IEEE MICRO Title: The Alpha 21364 network architecture	2002	22	26		27
IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT Title: Transformation of a health care information system: A self-assessment survey	1999	46	299		6
IN PRESS ASIS 9L	1996	33			1
IN PRESS CYBERPSYCHO					1
IN PRESS HUMAN INFOR					1

Figure 3: As there was no year, volume or page information for this citation, the citing article was accessed. The reference list provided full bibliographic information, and indicated where the citation belonged.

In the case of four individuals, problems were encountered during the ‘Cited Reference Search’ which could not be overcome. A cited item could not be attributed to one author because they shared the same last name and first initial as another researcher publishing in LIS, and it was not possible to determine to which individual the citation belonged. For three other researchers, a few cited items had insufficient information to be able to add them to others, and despite using the strategies outlined above, could not be collated with existing entries. As there seemed to be no precedent for ‘managing’ these types of citations, a decision was made to simply exclude them, and they were not considered when calculating *h*-index scores. It is worth noting these problems may have been overcome if ‘a comprehensive and current bibliography’ for each researcher in the sample had been obtained (Jacso, 2008c). This approach has not been deemed necessary by other studies, and would have also relied on cooperation from the researchers in the sample. However without a bibliography, it was found that a ‘Cited Reference Search’ could return a large number of ‘hits’ for more common names (some of these were ‘unpublished’ or ‘in press’ items, which were excluded). Needing to browse this many results introduces a ‘human factor’ to calculating *h*-index scores, and indicates why Cronin and Meho (2006) used two different researchers so that searches could be conducted twice.

3.5 Management of Data

For each individual in the research sample, data obtained from the 'General' and 'Cited Reference' searches was downloaded to a prepared Excel spreadsheet. Column headings mirrored those used in a WoS 'Cited Reference Search', allowing for the easy transfer of data between the two applications. For each cited item, the following information was recorded: the author's name, the journal title in which the cited item appeared, the relevant year, volume and page information, and the number of citing articles. As already discussed, much of this data needed to manually 'cleaned' and organised before final *h*-index scores could be calculated. This aspect of the study was a time-consuming process, supporting assertions made by Jacso (2008b) and others that identifying 'orphan' and 'stray' references in WoS can be difficult. While the time it took to generate the necessary citation data for each individual was not recorded, it is believed the average would have been lower than reported in the Cronin and Meho (2006) study (3 hours). This is not surprising however, given they ranked some of the most highly cited LIS faculty from the United States. In this study (as would be expected) the researchers with uncommon names and few publications took the least time, while the more 'influential' individuals took longer.

After each of the 'General' and 'Cited Reference' searches had been conducted, *h*-index scores were calculated in order to assess the difference between the two strategies. While this was not the primary focus of the study, the approach used to collate citation data allowed such a comparison to be made. For each individual a 'General' search was carried out first, and the 'Sort' function in Excel used to rank their papers by the number of times they had been cited (Method A). Their *h*-index score was then calculated using the same method employed by the software-generated WoS *h*-index and outlined by Kelly and Jennions in their 2006 paper. For example, where a researcher's ninth most cited paper had been cited at least nine times, but their tenth most cited paper had only been cited nine times, their *h*-index was recorded as nine. In other words, a researcher had an *h*-index of nine if they had published nine papers each of which had been cited by others at least nine times. Data obtained from a 'Cited Reference' search was then added to the spreadsheet, colour-coded to allow identification of these items, and the sort repeated to generate the final *h*-index score for that individual (Method B). For some researchers, all their citation data was found through a 'Cited Reference Search', while for others, their *h*-index score was not affected (see Table 1).

TABLE 1: Researchers ranked by *h* -index

	h -index			
	Method B		Method A	
Researcher	*h* -index	Rank	*h* -index	Rank
23	23	1	21	1
19	12	2	7	2t
18	8	3	3	7t
30	7	4	7	2t
32	6	5	3	7t
28	5	6t	5	4
16	5	6t	0	24t
2	4	8t	4	5t
33	4	8t	4	5t
13	4	8t	2	9t
24	4	8t	2	9t
20	4	8t	1	14t
8	3	13t	2	9t
22	3	13t	1	14t
26	2	15t	2	9t
31	2	15t	2	9t
1	2	15t	1	14t
9	2	15t	1	14t
15	2	15t	1	14t
29	2	15t	1	14t
11	2	15t	0	24t
3	1	22t	1	14t
21	1	22t	1	14t
25	1	22t	1	14t
35	1	22t	1	14t
4	1	22t	0	24t
5	1	22t	0	24t
7	1	22t	0	24t
14	1	22t	0	24t
27	1	22t	0	24t
34	1	22t	0	24t
6	0	32t	0	24t
10	0	32t	0	24t
12	0	32t	0	24t
17	0	32t	0	24t

Overall, augmenting the findings of a 'General Search' with data obtained from a 'Cited Reference Search' produced *h*-index scores that were on average 65% higher. More notable changes include Researcher 18, who had an *h*-index of 3 after the 'General Search', but an *h*-index of 8 when 'Cited Reference Search' citation data was added (a 167% change). Researchers

20 and 22 both had *h*-index scores of 1 based on findings from the 'General Search', but climbed to 4 and 3 respectively (a 200% and 300% change) after the 'Cited Reference Search'. Perhaps the most significant change was in the *h*-index score of Researcher 16, whose *h*-index rose from 0 to 5 after 'Cited Reference Search' data was added to the results of the 'General Search'. However, the rankings of individuals were not unduly affected by the method used to calculate *h*-index scores, which is consistent with the conclusions made by Norris (2008). The notable changes to the top five include Researchers 18 and 32 moving into the 3rd and 5th positions respectively, while Researchers 2 and 33 drop out to be tied for 8th. While Norris (2008) found a large variation in ranked position for a few researchers in his sample (up to 55 places), only one such case was found in this study (Researcher 16). It is reasonable to suggest however that this is due to this study's smaller sample size, and the density of the tied rankings in the mid ranges.

3.6 Analysis Techniques

Statistical analyses were carried out on the 'final' *h*-index scores of researchers using Microsoft Excel 2007 and the Excel add-in package 'Analysis ToolPak'. Descriptive statistics were produced to illustrate the basic features of the data obtained, and the results were summarised into tables or graphs in order to communicate the findings. As is usual in the quantitative analysis of data, the distribution, central tendency and dispersion of *h*-index scores across each of the variables being considered were calculated. In order to compare differences between two sets of *h*-index scores, and assess whether there was a statistically significant difference between their sample means, Mann-Whitney U tests were conducted. Where there were several groups being considered, a Kruskal-Wallis test was used to explore whether there was a statistically significant difference between their *h*-index scores. As some groups in the sample were not sufficiently large to give meaningful results, and in order to strengthen the results from the test, it was necessary to exclude some groups from this analysis. To determine if there was a linear relationship between *h*-index scores and one of the variables, a regression was run. While the results of the other statistical tests employed were conveyed in table form, in this case a graph was also created in order to illustrate the extent of the relationship.

4

Findings/Results

This section uses descriptive statistics to explain the data, and details the results from the inferential statistical analyses carried out during the study. These statistical analyses were designed to answer the research hypotheses, and it has been possible to draw conclusions regarding the influence of the four variables the study considered. Results from the study are considered in relation to comparable studies (where they exist), and the reasons for any differences (or similarities) in research findings are explored. The scope and purpose of this study means it is not possible to provide definite explanations for our findings however, and this area should be considered the domain of further research.

4.1 *h*-index Scores: The 'Complete Data Set'

Table 2 shows the breakdown of *h*-index scores for all the New Zealand and Australian-based LIS academics which were included in this study (the 'complete data set'). 60% of the researchers in the sample (21) had an *h*-index score that was ≤ 2, indicating they had never been cited at all or only had publications that had been cited once or twice. While this may seem surprising, it is well known that citation counts in the field of LIS are generally lower than in other subjects, particularly the natural sciences. In addition, studies by Oppenheim (2007) and Levitt & Thelwall (2009), which have calculated the *h*-index scores for 'influential' LIS academics, have found similar results.

TABLE 2: Breakdown of *h* -index scores: Complete data set

h- index	Count
0	4
1	10
2	7
3	2
4	5
5	2
6	1
7	1
8	1
9	0
10+	2

Levitt and Thelwall (2009) for example identified the most highly cited LIS articles published in WoS prior to 2007 and calculated the *h*-index scores for the first authors of these papers. They found that over 30% had an *h*-index score of just 1 or 2, indicating there is not necessarily a link between high citation counts and high *h*-index scores. Like Oppenheim (2007) and Levitt and Thelwall (2009), who found considerable variation in *h*-index scores, our sample also produced a wide range (see Table 3), due in part to one notable outlier. As would be expected given the frequency distribution above, the mean for the complete data set was just 3.21 and the median 2 (compared with Oppenheim (2007) median=7, and Cronin and Meho (2006) median=9).

TABLE 3: Descriptive Statistics - Complete data set

	h- index
Mean	3.21
Median	2.00
Mode	1.00
Standard deviation	4.28
Range	23.00

4.2 *h*-index Scores: The Influence of Gender

The research sample included 16 male and 19 female LIS academics, and Table 4 shows the breakdown of *h*-index scores by gender. The *h*-index scores of both males and females are concentrated in the lower range, with 63% of males and 58% of females obtaining an *h*-index score of between 0 and 2. Although previous studies from LIS have calculated *h*-index scores for both males and females, they do not explicitly provide a breakdown of scores by gender, meaning direct comparisons are difficult. In the case of Oppenheim (2007), who only lists the researchers who obtained an *h*-index of 5 or above in his final report, this task would not be possible.

TABLE 4: Breakdown of *h* -index scores: Gender

	Count	
***h*- index**	**Male**	**Female**
0	0	4
1	5	5
2	5	2
3	2	0
4	1	4
5	1	1
6	1	0
7	0	1
8	0	1
9	0	0
10+	1	1
Total	**16**	**19**

Males and females in the research sample shared the same median (2.00) and mode (1.00), while the mean only differed slightly (3.00 compared with 3.58). However, the range of scores for females was much wider (11.00 compared with 23.00), because female researchers held both the lowest (0) and highest (23) *h*-index scores calculated during the study. Studies from the field of LIS which have calculated the *h*-index of researchers (such as Cronin & Meho (2006) and Oppenheim (2007)) have focused on ranking individuals based on their *h*-index score. As they did not provide descriptive statistics considering the *h*-index scores of men and women, comparisons with this study's findings are not possible.

TABLE 5: Descriptive Statistics - Gender

	***h*- index**	
	Male	**Female**
Mean	3.00	3.58
Median	2.00	2.00
Mode	1.00	1.00
Standard deviation	2.83	5.27
Range	11.00	23.00

To test H_o: 'There is no statistically significant difference between the *h*-index scores of male and female LIS researchers in New Zealand and Australia' a Mann-Whitney U test was used. This was appropriate because the test determines whether there is a significant difference between two sample means. As a non-parametric test, it should also be used when the populations are not normally distributed (skew of male *h*-index scores =2.42; skew of female *h*-index scores=3.04). Results from the test showed the *h*-index scores of male and female LIS researchers were not significantly different (U=167, n_1=16, n_2=19, P>0.05, two-tailed), meaning the null hypothesis could not be rejected.

TABLE 6: Mann-Whitney U test - Gender

U	167.00
n_1	16.00
n_2	19.00
P	0.63

It is difficult to state whether this study's findings should be considered unexpected, because the literature is divided regarding the relationship between gender and research performance. The so-called 'gender gap' in research productivity has been well reported, and previous studies have generally found women produce 50% less than men (Meadows, 1998). It has also been shown that in many cases, males receive substantially more citations to their work than females, more or less in line with the productivity difference (Cole & Singer, 1991). This would suggest the *h*-index scores of men and women would also be significantly different, which is what Kelly and Jennions found in their 2006 study. On the other hand, Tower, Plummer and Ridgewell (2007) have argued past research has been 'somewhat mixed' in determining whether women are less productive than men. They showed there was no difference between men and women in terms of research productivity or quality in any of the three major disciplines they examined. Chen, Gupta and Hoshower (2006) have also concluded there is no relationship between research productivity and gender after finding similar results. As Kelly and Jennions (2006) represent the only paper to consider the *h*-index in relation to the gender variable, this study is the first of its type to support these assertions.

Why might this be? To begin with, claims first made by Cole and Zuckerman (1984) about the gender gap in research productivity have remained largely unchallenged. This is despite the fact that in 1998 Xie and Shauman were able to show that the sex difference in research productivity had declined, and it would fair to expect this trend to have continued over the past ten years. Secondly, there is evidence which suggests there is little direct effect of gender on research productivity, and that personal characteristics, structural positions and contextual influences are instead the cause (Xie & Shauman, 1998). While studies have shown male and female researchers have differed in these respects somewhat in the past, these differences have also declined in recent years due to changes in wider society (Xie & Shauman, 1998). Another possible explanation for this study's finding is that LIS is a field which has been traditionally associated with women. Curtis and Matthewman (2003) argue 'feminised' subjects such as LIS foster a culture of 'teaching and training', which often outweighs the drive to produce quantifiable research activity (cited in Curtis and Phibbs, 2006). If it were possible to prove there was some creditibility in this statement, it may support male and female LIS academics performing equally well in assessment exercises such as the *h*-index.

While these explanations have to remain speculative, it is possible to consider the implications of this study's finding for the use of the *h*-index in research evaluation. Kelly and Jennions (2006) found that women in their study had significantly lower *h*-index scores, and thus stated that the *h*-index does not represent an 'equitable' measure of research performance. They speculated that their findings would be true of other disciplines as well, and subsequently warned against the use of the *h*-index for evaluative purposes. However, as Kelly and Jennions (2006) represent the only study to consider the effect of gender on *h*-index scores, this assertion has remained untested. We can confirm that for LIS researchers in New Zealand and Australia, there is no statistically significant difference in the *h*-index scores of men and women. It is therefore reasonable to conclude that assessors in New Zealand and Australia can consider the *h*-index a 'fair' measure of performance when evaluating LIS academics.

4.3 *h*-index Scores: The Influence of Country

The research sample was split unequally between 8 New Zealand and 27 Australian based academics, with Table 7 showing the breakdown of *h*-index scores by country. 50% of the researchers from New Zealand, and 60% from Australia had an *h*-index of ≤2, while the only three scores greater than 8 came from Australia. Although the studies by Norris (2008) and Levitt and Thelwall (2009) have considered LIS researchers from different countries, they have not provided a similar breakdown of *h*-index scores. Therefore in this case a frequency distribution is less helpful when comparing this study's results with those conducted in the US and UK.

TABLE 7: Breakdown of *h* -index scores: Country

	Count	
***h*- index**	**NZ**	**Australia**
0	0	4
1	2	8
2	2	5
3	0	2
4	1	4
5	1	1
6	1	0
7	1	0
8	0	1
9	0	0
10+	0	2
Total	**8**	**27**

There were differences in the mean (3.50 compared with 3.26), the median (3.00 compared with 2.00) and the mode (2.00 compared with 1.00) in favour of New Zealand researchers. The standard deviation for New Zealand researchers was 2.33, indicating a narrower dispersion of *h*-index scores around the mean, while Australian researchers held the wider range (23). The medians for both New Zealand and Australian researchers were lower than those reported by Cronin and Meho (2006) and Oppenheim (2007) for US (9) and UK (7) based academics. However, because these studies employed different methodologies and considered different variables, a direct comparison cannot be made.

TABLE 8: Descriptive Statistics - Country

	***h*- index**	
	NZ	**Australia**
Mean	3.50	3.26
Median	3.00	2.00
Mode	2.00	1.00
Standard deviation	2.33	4.74
Range	6.00	23.00

To test H_o: 'There is no statistically significant difference between the *h*-index scores of LIS researchers in New Zealand and LIS researchers in Australia' a Mann-Whitney U test was used. This was appropriate because the test determines whether there is a significant difference between two sample means. As a non-parametric test, it should also be used when the populations are not normally distributed (skew of New Zealand *h*-index scores =0.36; skew of Australian *h*-index scores=3.20). Results from the test showed the *h*-index scores of LIS researchers in New Zealand and LIS researchers in Australia were not significantly different (U=137.5, n_1=8, n_2=27, P>0.05, two-tailed), meaning the null hypothesis could not be rejected.

TABLE 9: Mann-Whitney U test - Country	
U	137.50
n_1	8.00
n_2	27.00
P	0.25

Because there is evidence which shows the performance of academics varies by country, there was good justification for testing for a difference in *h*-index scores in this study. For instance, differences in the productivity patterns of researchers in Western countries, compared with those in developing countries, are well recognised. In addition, it has been argued that individuals in developing nations receive fewer citations to their work than academics living in leading research countries (Mishra, 2008). There have also been many scientometric studies carried out which consider the accomplishments of more comparable countries, particularly in the fields of science and technology (Moed, 2005). In some cases these have shown significant differences; Soteriades and Falagas (2004) for example found the productivity of countries in the EU was just 76% of that of the US. Analysis conducted as part of the PBRF exercise has also concluded that in terms of research impact, Australian G8 universities (overall) outperform those in New Zealand (Ministry of Education, 2007a). Finally, the two *h*-index studies which have considered country as a variable (Kelly and Jennions (2006) and Mugnaini et al. (2008)) showed country of residence had an impact on *h*-index scores. This study's finding regarding the influence of country on *h*-index scores was therefore unexpected.

The study by the Ministry of Education (2007a) also specifically considered LIS departments in New Zealand and Australia. In the field of LIS, the Ministry of Education (2007a) found the New

Zealand institution included in this study had a 'relative impact score' above that of the universities in Australia. However, the Ministry of Education (2007a) study did use a different measure of research performance, and employed a different time-frame (2000-2005), from this study. This means that although the Ministry of Education (2007a) also considered the effect of country on research performance, methodological differences makes a direct comparison with our findings difficult. A possible reason why our study found the way it did may be because the history of LIS education in Australia has been somewhat 'chequered'. Anecdotal evidence and personal communication with researchers suggests Australian based academics were outperforming their New Zealand counterparts several years ago. However, the restructuring of LIS departments in Australia in recent years, compared with the relatively stable environment in New Zealand, has seen this situation reverse. When the last twenty or so years are being considered, this may result in an 'averaging' of Australia's research performance, and make the two countries more comparable.

As there is good evidence that country of residence affects research performance, it is common practice for countries to complete international benchmarking exercises. The use of bibliometric tools in this process is also increasing, and one would expect to find differences in the *h*-index scores of individuals from different countries. Differences in material resources and formal communication are two factors which are often cited as leading to these varying levels of research impact. It was therefore expected that previous studies (Kelly and Jennions (2006) and Mugnaini et al. (2008)) would show *h*-index scores are influenced by country of residence. This study however, found that there was no statistically significant difference in the *h*-index scores of LIS researchers in New Zealand and LIS researchers in Australia. While we can only speculate on why this might be, it is possible to conclude that LIS researchers currently working in these two countries have had the same level of research impact.

4.4 *h*-index Scores: The Influence of Institution

Table 10 shows the breakdown of *h*-index scores by the eight institutions the research sample was drawn from (hereafter referred to as institutions A through H). This study's focus on research active individuals meant some academics were not included in the sample and the split of researchers across institutions was subsequently uneven. Table 10 indicates that the two institutions with the highest number of researchers in the sample (E and H) also have the highest *h*-index scores, with institution E obtaining the only two scores ≥10. A comparison across all eight institutions was not appropriate, given institutions B, C, E and F had so few researchers in the sample.

TABLE 10: Breakdown of *h* -index scores: Institution

	Count							
***h*- index**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
0	1	1	1	1	1	0	0	0
1	2	1	0	1	0	1	1	2
2	1	1	1	1	0	1	0	2
3	0	1	0	0	1	0	0	0
4	1	0	0	1	2	0	0	1
5	0	0	0	1	0	0	0	1
6	0	0	0	0	0	0	0	1
7	0	0	0	0	0	0	0	1
8	0	0	0	0	1	0	0	0
9	0	0	0	0	0	0	0	0
10+	0	0	0	0	2	0	0	0
Total	**5**	**4**	**2**	**5**	**7**	**2**	**1**	**8**

As a result, subsequent analysis excluded institutions B, C, E and F, and Table 11 shows the descriptive statistics for institutions A, D, E and H only. Institutions E and H had both the highest scoring individuals and the highest means in the sample, with Institution E obtaining a mean of 7.86, and Institution H a mean of 3.56. The one notable outlier in this study (Researcher 23) comes from institution E, and accounts for their wide range (22.00) and standard deviation (7.60). The medians across all four institutions are more comparable, but as no studies from LIS consider institution as a variable, it is not possible to compare these findings with other *h*-index applications.

TABLE 11: Descriptive Statistics - Institution

	***h*- index**			
	A	**D**	**E**	**H**
Mean	1.60	2.40	7.86	3.56
Median	1.00	2.00	4.00	3.00
Mode	1.00	#N/A	4.00	2.00
Standard deviation	1.52	2.07	7.60	2.33
Range	4.00	5.00	22.00	6.00

To test H_o: 'The institutional affiliation of New Zealand and Australian LIS researchers has no statistically significant effect on their *h*-index scores' a Kruskal-Wallis test was used. This was appropriate because the test determines whether there is a significant difference between three or more sample groups. As a non-parametric test, it should also be used when the populations are not normally distributed (skew of *h*-index scores at institution A=1.19; D=0.24; E=1.60; H=0.36). Results from the test showed there was no significant difference in the *h*-index scores of LIS researchers at institutions A, D, E and H (H=5.74, 3 df, P>0.05) meaning the null hypothesis could not be rejected.

TABLE 12: Kruskal-Wallis test - Institution

H	5.74
df	3.00
P	0.13

There is good evidence that institutional affiliation, or more accurately, affiliation to a particular university department, can influence the quality of research produced by academics. In the US and UK for example, the difference between elite and lower ranked universities is well recognised (Meadows, 1998). Research has shown that the influence of institutional affiliation is so great that scientists who move to more prestigious institutions increase their rate of publication (Allison & Long, 1990). In this part of the world, the Group of Eight (G8) universities in Australia are seen as well-established institutions which are generally more focused on research. As a result, their performance is expected to be higher than that of the non-G8 universities, and research shows that in the period covering 1981-2005, this was the case across all major disciplines (Ministry of Education, 2007a). In New Zealand, the 2003 PBRF illustrated research performance within the university sector in this country is also very uneven (Tertiary Education Commission, 2004). An analysis of New Zealand and Australian universities has also shown a marked difference in research performance across the two country's institutions, particularly in some subject areas. As one of these subject areas was LIS, this study's finding is somewhat unexpected.

The analysis, which was carried out by the Ministry of Education (2007a), considered the research performance of New Zealand institutions compared with those in Australia. It showed that in LIS, there was a significant difference in the relative impact scores of New Zealand

(Institution H), Australian G8 (D), and Australian non-G8 (A and E, plus others) universities. However, the Ministry of Education (2007a) used a different measure of research performance, and employed a different time-frame (2000-2005), from this study. As noted in section 4.3, this means that comparing the Ministry of Education (2007a) study with our findings is not appropriate. When speculating on the reasons for this study's findings, it has been suggested that researchers in some Australian LIS departments have a teaching, rather than research, focus. This may be related to the history of LIS education in Australia, where many university postgraduate LIS programmes began in colleges of education with an emphasis on practical training. Alternatively, there could be a stronger research focus in the New Zealand institution (H) considered by the study, due to differences in the way their LIS postgraduate programme is structured. This means that while we might have expected the Australian institutions in the study to have higher *h*-index scores, we found no significant difference.

As already noted, the fact there are differences between universities has long been recognised, and in some countries (particularly the US) the gap is known to be large. Differences are known to exist between New Zealand and Australian universities as well, both in terms of overall measures of research performance, and when narrower subject areas are considered. In addition, Oppenheim (2007) found that in the UK, LIS researchers with the highest *h*-index scores were concentrated in a few departments, though he did not test for significance. One would therefore expect that institutional affiliation would influence the *h*-index scores of researchers, which is what Kelly & Jennions illustrated in their 2006 study. We found, however, that there was no statistically significant difference in the *h*-index scores of New Zealand and Australian LIS researchers at institutions A, D, E and H. This means that for the researchers in our sample, we can conclude that institutional affiliation had no influence on their *h*-index scores.

4.5 *h*-index Scores: The Influence of Scientific Age

In the case of scientific age, it was appropriate to group the *h*-index scores into two ranges and consider the frequencies for each (see Table 13). While the scores could have been grouped into quartiles, for example, these two ranges were chosen as they enabled the research sample to be split more evenly (18-17). Table 13 shows *h*-index scores were concentrated at the lower end for both ranges, although the percentage was higher for researchers with a scientific age of 0-13

(72% compared with 47%). As might have been expected, the researchers with the seven highest scores in the study, and the only academics to obtain a score ≥5, had a scientific age of 14+.

TABLE 13 : Breakdown of *h* -index scores: Scientific Age

	Count	
***h*- index**	**0-13**	**14+**
0	3	1
1	5	5
2	5	2
3	1	1
4	4	1
5	0	2
6	0	1
7	0	1
8	0	1
9	0	0
10+	0	2
Total	**18**	**17**

To calculate measures of central tendency and variance, *h*-index scores were split into the same two ranges (see Table 14). While the mean was somewhat higher for researchers with a scientific age of 14+ (4.82 compared with 1.89), the median of the two groups was more comparable (3.00 compared with 2.00). However, the mode was lower for the group of researchers with a scientific age of 14+ (1.00), which suggests time-in-field is not always an indication of scientific impact. Cronin and Meho (2006) reported similar findings in their study of LIS academics in the US, where several researchers shared the same *h*-index score despite differences in scientific age.

TABLE 14: Descriptive Statistics - Scientific Age

	***h*- index**	
	0-13	**14+**
Mean	1.89	4.82
Median	2.00	3.00
Mode	2.00	1.00
Standard deviation	1.41	5.67
Range	4.00	23.00

To test H_o: 'There is no statistically significant relationship between scientific age and the *h*-index scores of LIS researchers in New Zealand and Australia' a regression analysis was used. This was appropriate because a regression tests whether (and how) a given variable (in this case scientific age) is related to another variable (*h*). Results from the regression showed there was a positive relationship between scientific age and the *h*-index scores of LIS researchers in New Zealand and Australia (F=4.75; P<0.05) meaning the null hypothesis could be rejected. It also indicated the extent of this relationship; for every year one can expect a 0.24 increase in *h*-index score (see Figure 4).

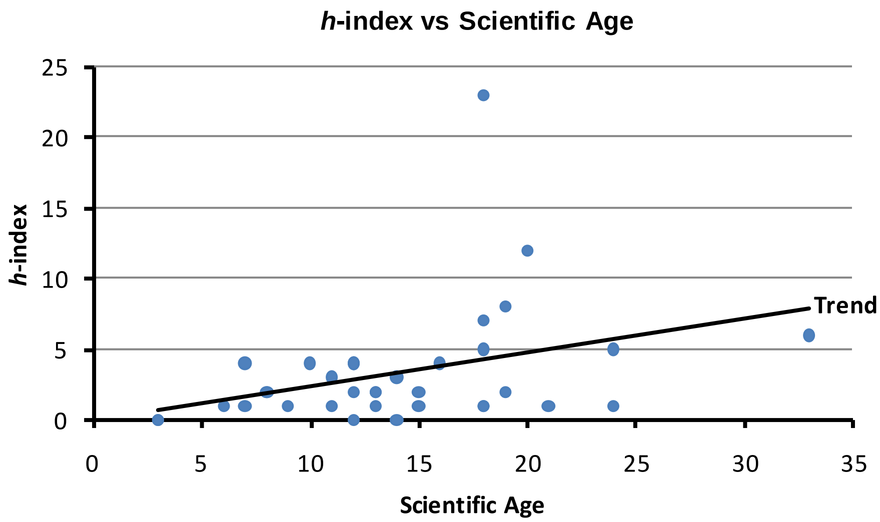
TABLE 15: Regression Analysis - *h* -index vs Scientifc Age

Multiple R	0.35
R Square	0.13
Adjusted R Square	0.10
Standard Error	4.06
Observations	35

ANOVA	**df**	**SS**	**MS**	**F**	**Sig F**
Regression	1.00	78.48	78.48	4.75	0.04
Residual	33.00	545.07	16.52		
Total	34.00	623.54			

Output	**Coefficients**	**S Error**	**t Stat**	**P-value**	**L 95%**	**U 95%**
Intercept	-0.11	1.71	-0.06	0.95	-3.59	3.38
Age	0.24	0.11	2.18	0.04	0.02	0.47

FIGURE 4: Regression Analysis – *h*-index vs Scientific Age



These findings were to be expected, given "it should be immediately apparent that *h* depends on scientific age" (Kelly & Jennions, 2006, p. 167). This is because a researcher's pool of published papers, and the citations that each of those papers receives, will increase over time (Kelly & Jennions, 2006). It should be noted that when proposing the *h*-index, Hirsch (2005) argued that *h* and scientific age would have an almost linear relationship, based on the fact papers accumulate citations at a fixed rate. While Kelly and Jennions (2006) argued this was a 'simplifying assumption', their own study of ecologists and evolutionary biologists showed *h*-index scores were positively related to scientific age. Results from our application of the *h*-index confirm this finding for LIS researchers in New Zealand and Australia, although there were some notable exceptions to the rule. As Cronin and Meho (2006) found when ranking LIS researchers in the US, several researchers in the study had the same *h*-index despite considerable differences in scientific age. To illustrate this, Table 16 provides the *h*-index score of every researcher in the sample and their scientific age (note that Cronin and Meho (2006) counted scientific age (or 'time-in-field') as beginning the year a researcher received their first citation, while this study used the year a researcher published their first paper).

TABLE 16: The scientific age and *h* -index scores of researchers

Scientific Age	*h*- index
3	0
3	0
6	1
7	1
7	4
8	2
8	2
9	1
10	4
11	1
11	3
12	0
12	2
12	4
12	4
13	1
13	2
13	2
14	0
14	3
15	1
15	2
16	4
18	1
18	1
18	5
18	7
18	23
19	2
19	8
20	12
21	1
24	1
24	5
33	6

For example, Table 16 shows that five researchers in the sample shared a scientific age of 18, yet their *h*-index scores ranged from 1 through to 23. Likewise, another seven researchers had been in the field for between 8 and 19 years, but all had an *h*-index score of just 2. Without questioning the overall findings of this study regarding the relationship between *h* and scientific age, it is worth considering why these inconsistencies (and those reported by Cronin and Meho

(2066)) may exist. To begin with, there is good evidence that the creativity peak of scientists occurs early, and that a researcher's major findings occur in their late 30s or early 40s. It is also at this time that most individuals are known to reach their productivity peak, before publishing rates decline during the remainder of their career (Meadows, 1998). It is therefore possible that when some LIS researchers reach a certain age, their creativity and productivity drops, and their *h*-index no longer increases at a steady rate. Secondly, Cronin and Meho (2006) argue that while there is a strong correlation between *h*-index scores and total citation counts, the *h*-index has some 'additional discriminatory power'. In other words, it may be that the *h*-index is simply a more accurate measure of a researcher's impact through various stages of their career.

It is well recognized in the literature that bibliometric measures are dependent on the length of academic career, and that researchers of different ages cannot be reliably compared. Kelly and Jennions (2006) showed that for ecologists and evolutionary biologists at least, *h*-index scores were also positively related to scientific age. They argued this made comparing the performance of younger researchers with older ones problematic, and believed using the *m* quotient may be more appropriate (Kelly & Jennions, 2006). Although a number of other studies have used the *h*-index to rank researchers, they have not considered the influence of age on *h*-index scores. We were able to confirm that for LIS researchers in New Zealand and Australia, there was also a positive relationship between scientific age and *h*-index scores. As a result, it is possible to conclude that when using the *h*-index to compare researchers from LIS in these two countries, their scientific age should be taken into consideration.

5

Conclusion

Worldwide, bibliometric measures are increasingly being employed in research evaluation exercises to rank both individual researchers and their institutions. As a result, it is important that any caveats associated with new bibliometric indicators, such as the *h*-index, are understood. Previous studies have demonstrated the advantages of the *h*-index over traditional bibliometric measures, but questions still remain regarding its use as an indicator of research performance. In particular, the literature indicates that several variables can influence the productivity of researchers and the number of citations they receive – the two factors measured by the *h*-index.

We calculated the *h*-index scores of LIS researchers in New Zealand and Australia using the WoS cited-reference enhanced database. Data was taken from a WoS 'General Search' and augmented with additional items and citations found through a WoS 'Cited Reference Search'. This method produced *h*-index scores that were on average 65% higher than if a WoS 'General Search' only had been conducted – a finding which is consistent with previous studies. As such, it is possible to conclude that the process of locating orphan and stray references in WoS can result in a more realistic *h*-index score for some researchers.

This study also considered the effect that gender, country of residence, institutional affiliation, and scientific age had on the *h*-index scores of LIS researchers in New Zealand and Australia. We found a positive relationship between scientific age and *h*-index scores, supporting assertions that the *h*-index should not be considered independently of a researcher's scientific age. There was no statistically significant difference in the *h*-index scores of men and women, indicating that for the researchers in our sample, the *h*-index does not show a gender effect. Likewise, country of residence and institutional affiliation were shown to have no influence on *h*-index scores of researchers in the sample.

6

Further Research

This research was the first to calculate the *h*-index scores of LIS researchers in New Zealand and Australia, and it could be developed further in a number of directions. To begin with, the difference between *h*-index scores calculated using a WoS 'General Search' and WoS 'Cited Reference Search' could be explored further. The study could also be replicated using either Scopus or Google Scholar, to determine if database choice had a significant effect on the *h*-index scores of the researchers. In order to establish whether our findings hold true in other countries, future research could be extended to include LIS researchers from around the world. Likewise, studies could be conducted between New Zealand and Australian researchers teaching in disciplines other than LIS. Given some of the findings in this study were unexpected, research could also be carried out on the relationship between the variables we considered and research performance. As an example, the reasons why this study found no significant difference in the *h*-index scores of male and female researchers could be explored further. Finally, it may be useful to determine if there is a correlation between the *h*-index scores of the researchers in our sample and their PBRF and Research Quality Framework (RQF)[4] assessment scores.

[4] The RQF was the precursor to the ERA initiative in Australia.

7

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Appendices

Appendix 1: Research Sample

Researcher	Institution	Country	Scientifc Age	Gender
1	A	Australia	13	Male
2	A	Australia	12	Female
3	A	Australia	21	Male
4	A	Australia	18	Male
5	A	Australia	9	Male
6	A	Australia	3	Female
7	B	Australia	11	Female
8	B	Australia	11	Male
9	B	Australia	12	Female
10	B	Australia	3	Female
11	C	Australia	8	Male
12	C	Australia	14	Female
13	D	Australia	16	Female
14	D	Australia	24	Male
15	D	Australia	15	Male
16	D	Australia	18	Female
17	D	Australia	12	Female
18	E	Australia	19	Female
19	E	Australia	20	Male
20	E	Australia	12	Female
21	E	Australia	7	Female
22	E	Australia	14	Male
23	E	Australia	18	Female
24	E	Australia	7	Male
25	F	Australia	18	Female
26	F	Australia	13	Male
27	G	Australia	15	Male
28	H	New Zealand	24	Male
29	H	New Zealand	8	Female
30	H	New Zealand	18	Female
31	H	New Zealand	19	Male
32	H	New Zealand	33	Male
33	H	New Zealand	10	Female
34	H	New Zealand	6	Female
35	H	New Zealand	13	Female

Appendix 2: *h*-index scores[5]

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 1	CATALOGING CLASSIFIC	2006	42	35	2
2	Researcher 1	BEHAVIORAL & SOCIAL SCIENCES LIBRARIAN	1996	15	1	2
3	Researcher 1	JOURNAL OF DOCUMENTATION	2007	63	175	1
4	Researcher 1	AUSTR ACAD RES LIB	2006	38	40	1
5	Researcher 1	AUSTR ACAD RES LIB	2006	35		1
6	Researcher 1	CATALOGING CLASSIFIC	2006	43	37	1
7	Researcher 1	J ED LIB INFORM SCI	2005	46	3	1
8	Researcher 1	INTERLENDING & DOCUMENT SUPPLY	2004	32	17	1
9	Researcher 1	INTERLENDING DOCUMEN	2004	31	17	1
10	Researcher 1	THESIS CITY U LONDON	2004			1

[5] In each table, dark shading indicates data was obtained from a WoS 'Cited Reference' search, while the paper number immediately above the black line represents a researcher's *h*-index score. Researchers 6, 10, 12 and 17 are missing from Appendix 2 because they had no citation data.

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 2	JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	2005	37	171	10
2	Researcher 2	JOURNAL OF DOCUMENTATION	2006	62	570	8
3	Researcher 2	JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	2003	35	87	8
4	Researcher 2	LIBRARY QUARTERLY	2007	77	181	5
5	Researcher 2	LIFELONG LEARNING WH	2004		218	3
6	Researcher 2	AUSTR LIB J	2005	54	230	2
7	Researcher 2	J WORKPLACE LEARNING	2006	18	186	2
8	Researcher 2	JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	2008	40	3	1
9	Researcher 2	INFORM RES	2007	12		1
10	Researcher 2	LIFELONG LEARNING PA	2006		182	1
11	Researcher 2	AUSTR LIB J	2005	54	288	1
12	Researcher 2	GROUP WORK	2003			1
13	Researcher 2	1 CARD U LEARN SUPP	1997			1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 3	LIBRARY & INFORMATION SCIENCE RESEARCH	2006	28	49	5
2	Researcher 3	LIBRARY ACQUISITIONS-PRACTICE AND THEORY	1988	12	29	1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 4	AUSTR ACAD RES LIB	2006	37	61	1
2	Researcher 4	AUSTRALIAN ACAD RES	1993	24	78	1
3	Researcher 4	AUSTR LIBRARY J	1991	40	27	1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 5	THESIS U TORONTO TOR	2005			1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 7	1995 NAT PRES OFF NP	1998			1
2	Researcher 7	LONG TERM MANAGEMENT	1998			1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 8	INTERLENDING & DOCUMENT SUPPLY	2004	32	109	4
2	Researcher 8	LIB MANAGEMENT	2004	25	300	4
3	Researcher 8	ELECTRONIC LIBRARY	2006	24	734	3
4	Researcher 8	1 MONDAY	2005	10		2
5	Researcher 8	EVIDENCE BASED PRACT	2004		49	2
6	Researcher 8	INFORMATION LIT WORL	2003		223	2
7	Researcher 8	AUSTR ACAD RES LIB	2007	38	84	1
8	Researcher 8	AUSTR LIB J	2005	54	66	1
9	Researcher 8	CONTINUING PROFESSIO	2005			1
10	Researcher 8	IFLA PUBLICATIONS	2005	116		1
11	Researcher 8	INCITE 0718	2005		26	1
12	Researcher 8	AUSTR ACAD RES LIB	2004	35	177	1
13	Researcher 8	CONSORTIA COLLECTION	2003			1
14	Researcher 8	AUSTR LIB J	2000	49	245	1
15	Researcher 8	THESIS U W AUSTR	1997			1
16	Researcher 8	SUBVERTING EMPIRE EX				1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 9	LIBRARY & INFORMATION SCIENCE RESEARCH	2004	26	29	11
2	Researcher 9	AUSTR LIB J	2003	52	169	3
3	Researcher 9	THESIS U W AUSTR PER	2001			2
4	Researcher 9	INT J EVID BASED HLT	2005	3	103	1
5	Researcher 9	J ED LIB INFORMATION	2003	44	246	1
6	Researcher 9	LIBRES	1997	7		1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 11	67 IFLA COUNC GEN C	2001			3

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 13	INFORM TECHNOLOGY PE	2003	16	289	15
2	Researcher 13	P 10 AUSTR C INF SYS	1999			5
3	Researcher 13	IEEE TRANSACTIONS ON INFORMATION TECHNOLOGY IN BIOMEDICINE	2005	9	157	4
4	Researcher 13	EUROPEAN JOURNAL OF EPIDEMIOLOGY	1998	587	587	4
5	Researcher 13	P 5 AUSTR C INF SYST	1994		635	3
6	Researcher 13	DECISION SUPPORT SYSTEMS	2007	43	1675	2
7	Researcher 13	ENCY KNOWLEDGE MANAG	2006			2
8	Researcher 13	P 38 ANN HAW INT C S	2005			2
9	Researcher 13	KNOWLEDGE MANAGEMENT FOR INFORMATION COMMUNITIES	2001		139	2
10	Researcher 13	CASE STUDIES AUST PR	1997	6	182	2
11	Researcher 13	P HAW INT C SYST SCI	1997	2		2
12	Researcher 13	P EXP GROUP WORKSH D	1996			2
13	Researcher 13	P 3 INT C INT SOC DE	1995	2	603	2
14	Researcher 13	INFORM SYSTEMS E BUS	2008	6	109	1
15	Researcher 13	MEDICAL JOURNAL OF AUSTRALIA	2008	12	S142	1
16	Researcher 13	INTELLIGENT DECISION	2006			1
17	Researcher 13	P 11 INT C INF PROC	2006			1
18	Researcher 13	EUROPEAN JOURNAL OF OPERATIONAL RESEARCH	2005	160	308	1
19	Researcher 13	INTELLIGENT DECISION	2005			1
20	Researcher 13	P 3 MOB BUS C M BUS	2004			1
21	Researcher 13	KNOWLEDGE MANAGEMENT	2002			1
22	Researcher 13	P 3 EUR C KNOWL MAN	2002		100	1
23	Researcher 13	DECISION SUPPORT SYSTEMS	2001	31	163	1
24	Researcher 13	10 AUSTR C INF SYST	1999			1
25	Researcher 13	JOURNAL OF ORGANIZATIONAL COMPUTING AND ELECTRONIC COMMERCE	1999	9	189	1
26	Researcher 13	P WORKSH INT DEC SUP	1995		93	1
27	Researcher 13	P 1 AUSTR NZ C INT I	1993		741	1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 14	MELBOURNE HIST J	1985	17	78	2
2	Researcher 14	RES APPL INF LIB STU	2004			1
3	Researcher 14	RES METHODS STUDENTS	2002		195	1
4	Researcher 14	J INF SCI	1997		103	1
5	Researcher 14	THESIS MONASH U	1994			1
6	Researcher 14	INFORMATION CAREERS	1990			1
7	Researcher 14	AUSTR COLLEGE LIBRAR	1986	4	91	1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 15	P 31 ANN HAW INT C S	1998	1	200	6
2	Researcher 15	AUSTR J INFORM SYSTE	2001	8	56	3
3	Researcher 15	J DECISION SYSTEMS S	2001	10	195	2
4	Researcher 15	KNOWLEDGE MANAGEMENT FOR INFORMATION COMMUNITIES	2001		139	2
5	Researcher 15	JOURNAL OF ORGANIZATIONAL COMPUTING AND ELECTRONIC COMMERCE	1999	2	189	2
6	Researcher 15	P 4 C INT SOC DEC SU	1997		429	2
7	Researcher 15	P 5 ISDSS INT C LAUS	1997			2
8	Researcher 15	P 5 INT C INF SYST D	1996		135	2
9	Researcher 15	P PAN PAC C INF SYST	1995		365	2
10	Researcher 15	P 13 INT C INF SYST	2004			1
11	Researcher 15	AUSTR C KNOWL MAN DE	2000		139	1
12	Researcher 15	DECISION SUPPORT KNO	2000			1
13	Researcher 15	INT C DEC SUPP THROU	2000			1
14	Researcher 15	P IFIP WG 8 3 C DEC	2000		122	1
15	Researcher 15	4 C INT SOC DEC SUPP	1997			1
16	Researcher 15	P 2 INT BALT WORKSH	1996			1
17	Researcher 15	THESIS MONASH U MELB	1995			1
18	Researcher 15	P 1 WORLD C COMP MED	1994			1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 16	ARCH MANUSCRIPTS	1996	24	28	7
2	Researcher 16	ARCH DOCUMENTS PROVI	1993			7
3	Researcher 16	ARCHIVARIA	1999	48	3	5
4	Researcher 16	RECORDS CONTINUUM I	1995			5
5	Researcher 16	ARCH RECORD KEEPING	2005			6
6	Researcher 16	ARCHIVAL SCI	2001	1	333	3
7	Researcher 16	ARCH MANUSCRIPTS	1991	19	17	3
8	Researcher 16	ARCHIFACTS APR	1999		1	2
9	Researcher 16	RECORDS MANAGEMENT J	1999	9	177	2
10	Researcher 16	ARCH MANUSCRIPTS	1994	22	150	2
11	Researcher 16	P INT C ARCH KUAL LU	2008			1
12	Researcher 16	ARCH MANUSCRIPTS	2005	33	146	1
13	Researcher 16	BKCONLINE METADATA S	2004			1
14	Researcher 16	THESIS MONASH U MELB	2001			1
15	Researcher 16	AM ARCHIVIST	2000	63	352	1
16	Researcher 16	ARCH MANUSCRIPTS	1998	26	24	1
17	Researcher 16	AUSTR SOC ARCH ANN C	1998			1
18	Researcher 16	E COMMUNICATION	1998			1
19	Researcher 16	YESTERDAY TODAY TOMO	1998			1
20	Researcher 16	P REC MAN ASS AUSTR	1997			1
21	Researcher 16	ARCHIVAL DOCUMENTS P	1993			1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 18	7 FACES INF LIT	1997			97
2	Researcher 18	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	1999	19	33	15
3	Researcher 18	NEW REV INFORMATION	1997	3	1	15
4	Researcher 18	AUSTR LIB J	1995	44	158	14
5	Researcher 18	INFORM LIT CATALYST	2002			13
6	Researcher 18	REFERENCE SERVICES R	2001	29	106	12
7	Researcher 18	HIGHER EDUCATION	1995	29	443	10
8	Researcher 18	AUSTR ACAD RES LIB	2000	31		8
9	Researcher 18	INFORM LITERACY WORL	2000			7
10	Researcher 18	AUSTR LIB J	2000	49	209	6
11	Researcher 18	STUDIES IN HIGHER EDUCATION	1994	19	217	6
12	Researcher 18	HIGHER ED RES DEV	1998	17	25	5
13	Researcher 18	STUDIES IN HIGHER EDUCATION	2004	29	219	3
14	Researcher 18	INF LIT M EXP PRAG C	2002			3
15	Researcher 18	SUPERVISING POSTGRAD	1999			3
16	Researcher 18	INFORM LIT WORLD ADV	2003			2
17	Researcher 18	INT ENCY INFORM LIB	2003		261	2
18	Researcher 18	INT J ACAD DEV	2002	7	31	2
19	Researcher 18	LIANZA C AUCKL NZ	1999		2	2
20	Researcher 18	INFORM LIT BLUEPRINT	1994			2
21	Researcher 18	QUALITY POSTGRADUATE	1994		143	2
22	Researcher 18	REFERENCE LIB	2005		139	1
23	Researcher 18	3 INT LIF LEARN C RO	2004		8	1
24	Researcher 18	LIFELONG LEARNING WH	2004			1
25	Researcher 18	LIT INFORM AGE INQUI	2003			1
26	Researcher 18	NAT FOR INF LIT US I	2002			1
27	Researcher 18	LEARNING PARTNERSHIP	2001			1
28	Researcher 18	NEW LIB WORLD	2001	102	158	1
29	Researcher 18	J INFORMATION MANAGE	1999	19	133	1
30	Researcher 18	NEW REV LIB INFORM R	1999	1	31	1
31	Researcher 18	STUDENT LEARNING INF	1998		141	1
32	Researcher 18	NEW REV INFORM LIB	1997		31	1
33	Researcher 18	INFORMATION LIT PHEN	1996			1
34	Researcher 18	LEARRNING TODAY PROF	1996		3	1

35	Researcher 18	DEV INFORM LIT GRADU	1995			1
36	Researcher 18	LEARNING LINK INFORM	1995			1
37	Researcher 18	INFORMATIONWEEK 0620	1994		50	1
38	Researcher 18	DEV STUDENTS LIBR RE	1992			1
39	Researcher 18	THESIS QUEENSLAND U	1992			1
40	Researcher 18	AUSTR ACAD RES LIB	1991	22	103	1
41	Researcher 18	AUSTR ACAD RES LIB	1990	21	224	1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 19	P RIAO 97 COMP ASS I	1997			30
2	Researcher 19	THESIS U NIJMEGEN NI	1993			26
3	Researcher 19	P 18 ACM SIGIR C RES	2000			24
4	Researcher 19	COMPUTER JOURNAL	1993	35	208	24
5	Researcher 19	P ACM SIGIR C RES DE	1994		112	20
6	Researcher 19	KNOWLEDGE ENGINEERING REVIEW	1998	13	263	19
7	Researcher 19	ARTIFICIAL INTELLIGENCE REVIEW	1996	10	381	16
8	Researcher 19	P EUR C HYP ECHT 90	1990		109	16
9	Researcher 19	P DAT BAS EXP SYST A	1990			15
10	Researcher 19	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2003	54	321	13
11	Researcher 19	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	120	12
12	Researcher 19	P 11 INT C INF KNOWL	2002			12
13	Researcher 19	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENC	1999	50	737	12
14	Researcher 19	KLUWER INT SERIES IN	1998	4	73	11
15	Researcher 19	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	2000	51	1090	10
16	Researcher 19	INTERNATIONAL JOURNAL OF EXPERT SYSTEMS	1994	7	107	9
17	Researcher 19	ACM SIGIR FOR	1991	25		9
18	Researcher 19	INTERNET APPLICATIONS	1999	1749	1	6
19	Researcher 19	8916 TR U NIJM DEP I	1989			6
20	Researcher 19	P INT C MANAGEMENT D	1989			6
21	Researcher 19	WE WILL SHOW THEM ES	2005	1	339	5
22	Researcher 19	LOGIC JOURNAL OF THE IGPL	2004	12	97	5
23	Researcher 19	ACM TRANSACTIONS ON INFORMATION SYSTEMS	2001	19	337	5
24	Researcher 19	LOGIC JOURNAL OF THE IGPL	2006	14	161	4
25	Researcher 19	DEXA	1990		76	4
26	Researcher 19	P 2 AAAI QUANT INT S	2008			3
27	Researcher 19	DECISION SUPPORT SYSTEMS	2007	44	251	3
28	Researcher 19	P 23 ANN ACM C RES D	2000			3
29	Researcher 19	QUERY REFORMULATION	1997			3
30	Researcher 19	P 7 AUSTR JOINT C AR	1994		592	3
31	Researcher 19	ACM SIGIR FORUM	1990	24		3
32	Researcher 19	AAA SPRING S	2007			2
33	Researcher 19	LECT NOTES ARTIF INT	2005	3738	84	2
34	Researcher 19	CIKM	2002		260	2

35	Researcher 19	INTERNATIONAL JOURNAL OF COOPERATIVE INFORMATION SYSTEMS	2001	10	57	2
36	Researcher 19	12TH IEEE INTERNATIONAL CONFERENCE ON TOOLS WITH ARTIFICIAL INTELLIGENCE, PROCE	2000		19	2
37	Researcher 19	DISCOVERING INFORM T	1996			2
38	Researcher 19	INFORMATION RETRIEVAL - NEW SYSTEMS AND CURRENT RESEARCH	1996		3	2
39	Researcher 19	P AUSTR DOC COMP S	1996		1	2
40	Researcher 19	P 16 ACM SIGIR C RES	1993		12	2
41	Researcher 19	HDB QUANTUM LOGIC	2007			1
42	Researcher 19	LECTURE NOTES IN COMPUTER SCIENCE	2006	3841	692	1
43	Researcher 19	LECTURE NOTES IN COMPUTER SCIENCE	2005	3735	84	1
44	Researcher 19	LECTURE NOTES IN COMPUTER SCIENCE	2004	3007	907	1
45	Researcher 19	DISCOVERY EXPLICIT I	2003			1
46	Researcher 19	P ACM SIGIR 2003	2003		219	1
47	Researcher 19	AUSTRALIAN COMPUTER SCIENCE COMMUNICATIONS	2001	23	109	1
48	Researcher 19	P 12 INT WORKSH DAT	2001		327	1
49	Researcher 19	P MFIR 01	2001			1
50	Researcher 19	23 ANN INT ACM SIGIR	2000			1
51	Researcher 19	ACM SIGIR	2000		280	1
52	Researcher 19	P ICTAI 2000 VANC BC	2000		19	1
53	Researcher 19	P INT C ADV INT SYST	2000		317	1
54	Researcher 19	P 22 ANN INT ACM SIG	1999			1
55	Researcher 19	P SIGIR CAL US	1999			1
56	Researcher 19	P 3 AUSTR DOC COMP S	1998		65	1
57	Researcher 19	COMPUTER ASSISTED IN	1997			1
58	Researcher 19	IJCAI 97 WORKSH AI D	1997			1
59	Researcher 19	P EUFIT 96 4 EUR C I	1997		841	1
60	Researcher 19	P 4 EUR C INT TECHN	1996			1
61	Researcher 19	P 5 RIAO C COMP ASS	1996			1
62	Researcher 19	P WIRUL 96 2 WORKSH	1996			1
63	Researcher 19	DECIDING TERM ABOUTN	1995			1
64	Researcher 19	P 1M ANN INT ACM SIG	1994		21	1
65	Researcher 19	P WORKSH PRINC DOC P	1994			1
66	Researcher 19	EFFICIENT CONTEXT SE	1993		13	1
67	Researcher 19	STRATIFIED INFORMATI	1993			1
68	Researcher 19	P COMPUTING SCI NETH	1991		135	1
69	Researcher 19	DISCOVERY LONDON J I		12		1

70	Researcher 19	SEMANTIC DATA FLOW D				1

Paper	Author	Cited Work	Year	Volume	Page	Citing Articles
1	Researcher 20	INT C INT COMP	2002		660	9
2	Researcher 20	LECT NOTES COMPUTER	2006	3915		6
3	Researcher 20	P 2002 INT C INT COM	2002			6
4	Researcher 20	COMPUTERS & ELECTRICAL ENGINEERING	2000	26	461	5
5	Researcher 20	10 PAC AS C KNOW DIS	2006			3
6	Researcher 20	8 AS PAC WEB C JAN C	2006			3
7	Researcher 20	2002 INT WORKSH WEB	2002			3
8	Researcher 20	DATA MINING WEB ENAB	2002			3
9	Researcher 20	P 1 AS PAC C COMP ME	2001		887	3
10	Researcher 20	LECTURE NOTES IN COMPUTER SCIENCE	2007	4518	473	2
11	Researcher 20	ENCY DATA WAREHOUSIN	2005			2
12	Researcher 20	LECTURE NOTES IN COMPUTER SCIENCE	2004	3306	199	2
13	Researcher 20	P INT C INF INT WEB	2004		427	2
14	Researcher 20	ARTIFICIAL NEURAL NE	2001			2
15	Researcher 20	INT J WEB SERV RES	2008	5	62	1
16	Researcher 20	KNOWL INF SYST	2008	14	97	1
17	Researcher 20	2007 IEEE WIC ACM IN	2007			1
18	Researcher 20	PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON WEB INTELLIGENCE	2007		351	1
19	Researcher 20	RES TRENDS DATA MINI	2007		309	1
20	Researcher 20	2006 IEEE ACM INT C	2006			1
21	Researcher 20	P 2006 IEEE WIC ACM	2006		1042	1
22	Researcher 20	P APWEB	2006		786	1
23	Researcher 20	P 6 WORLD MULT C SYS	2002			1
24	Researcher 20	P 26 ASME DES ENG TE	2000			1
25	Researcher 20	THESIS QUEENSLAND U	2000			1
26	Researcher 20	P PAC RIM KNOWL ACQ	1998		74	1
27	Researcher 20	P CONN SYST KNOWL RE	1997			1
28	Researcher 20	THESIS U ROORKEE IND	1995			1
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2	Researcher 21	AUSWEB 07 13 AUSTR W	2007			1
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4	Researcher 21	P INF SCI IT ED INSI	2003			1

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2	Researcher 22	3 INT C INT TUR SYST	1996		596	10
3	Researcher 22	LECTURE NOTES IN COMPUTER SCIENCE	1998	1452	274	5
4	Researcher 22	4 INT C INT TUT SYST	1998		274	3
5	Researcher 22	LECT NOTES COMPUTER	2002	2363		1
6	Researcher 22	INT J AI ED	1999		11	1
7	Researcher 22	LECT NOTES COMPUTER	1996	1086		1
8	Researcher 22	WORKSH ARCH METH DES	1996			1
9	Researcher 22	7 WORLD C ART INT ED	1995			1
10	Researcher 22	WORLD C ART INT ED	1995		307	1

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2	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2001	52	226	218
3	Researcher 23	COMPUTER	2002	35	107	123
4	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	1998	34	599	84
5	Researcher 23	WEB SEARCH PUBLIC SE	2004			63
6	Researcher 23	INTERNET RESEARCH-ELECTRONIC NETWORKING APPLICATIONS AND POLICY	1999	9	117	59
7	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	1997	48	741	58
8	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2001	52	1073	47
9	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	1997	48	382	44
10	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	639	42
11	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	1996	47	603	42
12	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2006	42	248	40
13	Researcher 23	ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY	1996	31	33	39
14	Researcher 23	ACM SIGIR FOR	2002			36
15	Researcher 23	INTERNET RESEARCH-ELECTRONIC NETWORKING APPLICATIONS AND POLICY	2000	10	317	35
16	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	1995	31	161	35
17	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2001	37	295	33
18	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2005	56	559	31
19	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2005	41	361	30
20	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	704	28
21	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	695	27
22	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	1997	48	728	24
23	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2004	40	319	23
24	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2002	38	401	23
25	Researcher 23	INFORM RES	2000	6		22
26	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2003	39	611	20
27	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	716	20
28	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2001	52	161	20
29	Researcher 23	LIBRARY & INFORMATION SCIENCE RESEARCH	2001	23	45	20
30	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2006	57	25	19
31	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2002	38	473	19
32	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2002	38	453	19
33	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	883	19
34	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	728	19

35	Researcher 23	JOURNAL OF INFORMATION SCIENCE	1999	25	477	19
36	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	1998	34	257	19
37	Researcher 23	P 17 ANN ACM SIGIR C	1994			17
38	Researcher 23	THESIS RUTGERS U	1993			17
39	Researcher 23	LIBRARY & INFORMATION SCIENCE RESEARCH	2001	23	301	16
40	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2002	38	605	15
41	Researcher 23	INTERACTING WITH COMPUTERS	1998	10	249	15
42	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1992	29	67	15
43	Researcher 23	D LIB MAGAZINE	1998	4		14
44	Researcher 23	ONLINE & CDROM REVIEW	1997	21	271	14
45	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1997	34	111	14
46	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1993	30	115	13
47	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2006	42	1379	12
48	Researcher 23	ONLINE INFORMATION REVIEW	2003	27	396	12
49	Researcher 23	NEW DIRECTIONS COGNI	2005			11
50	Researcher 23	JOURNAL OF DOCUMENTATION	2004	60	336	11
51	Researcher 23	LIBRARY TRENDS	2003	52	299	11
52	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	953	11
53	Researcher 23	D LIB MAGAZINE	1999	5		11
54	Researcher 23	P 2 INT C INF SEEK C	1998			11
55	Researcher 23	INFORM RES	1994	4		11
56	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1992	29	249	11
57	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2004	40	113	11
58	Researcher 23	WEBOLOGY	2004		1	10
59	Researcher 23	INFORMATION RES	1998	4		10
60	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2006	425	264	9
61	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2001	37	843	9
62	Researcher 23	MIRA 99 EVALUATING I	1999			9
63	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1993	30	63	9
64	Researcher 23	MODELING USERS SUCCE	1998			8
65	Researcher 23	P WEB NET 98 C OR FL	1998			8
66	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	1996	32	681	8
67	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2006	57	1875	7
68	Researcher 23	19TH ANNUAL NATIONAL ONLINE MEETING, PROCEEDINGS-1998	1998		375	7
69	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE	1998	49	364	7

70	Researcher 23	P 19 ANN INT ACM SIG	1996			7
71	Researcher 23	INTERNATIONAL JOURNAL OF INFORMATION MANAGEMENT	2004	24	131	6
72	Researcher 23	IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT	1999	46	299	6
73	Researcher 23	ONLINE & CDROM REVIEW	1993	17	275	6
74	Researcher 23	13TH NATIONAL ONLINE MEETING : PROCEEDINGS - 1992	1992		363	6
75	Researcher 23	ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY	2008	42	93	5
76	Researcher 23	JOURNAL OF DOCUMENTATION	2006	62	171	5
77	Researcher 23	INTERNET RESEARCH-ELECTRONIC NETWORKING APPLICATIONS AND POLICY	2005	15	49	5
78	Researcher 23	JOURNAL OF DOCUMENTATION	2005	61	548	5
79	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2004	55	767	5
80	Researcher 23	PROCEEDINGS OF THE ASIST ANNUAL MEETING	2003	40	416	5
81	Researcher 23	1 MONDAY	2001	6	4	5
82	Researcher 23	NEW DIRECTIONS HUMAN			137	5
83	Researcher 23	ONLINE INFORMATION REVIEW	2006	30	485	4
84	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2005	41	1035	4
85	Researcher 23	HLTH INFO LIB J	2004	21	44	4
86	Researcher 23	ITCC 2004: INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY: CODING AND C	2004		309	4
87	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2004	55	657	4
88	Researcher 23	LIB TRENDS	2004	52	373	4
89	Researcher 23	LIBRARY TRENDS	2004	52	617	4
90	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2002	53	65	4
91	Researcher 23	MEDICAL DECISION MAKING	2002	22	514	4
92	Researcher 23	EXPLORING THE CONTEXTS OF INFORMATION BEHAVIOUR	1999		21	4
93	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1997	34	271	4
94	Researcher 23	ONLINE & CDROM REVIEW	1994	18	143	4
95	Researcher 23	ONLINE REVIEW	1992	16	297	4
96	Researcher 23	P 55 ANN M AM SOC IN	1992			4
97	Researcher 23	12TH NATIONAL ONLINE MEETING : PROCEEDINGS 1991	1991		329	4
98	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2007	58	744	3
99	Researcher 23	CYBERPSYCHOLOGY & BEHAVIOR	2004	7	65	3
100	Researcher 23	JOURNAL OF DOCUMENTATION	2004	60	266	3
101	Researcher 23	US VERS EUR WEB SEAR	2002	36	32	3
102	Researcher 23	PROCEEDINGS OF THE ASIST ANNUAL MEETING	2001	38	545	3
103	Researcher 23	CIKM 2000 9 INT C IN	2000		134	3

104	Researcher 23	ONLINE INFORMATION REVIEW	2000	24	389	3
105	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETINGS	2000	37	169	3
106	Researcher 23	P 20 NAT ONL M MAY 1	1999			3
107	Researcher 23	SEARCHING WEB SURVEY	1999	9	117	3
108	Researcher 23	INFORMATION RES	1996	2		3
109	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1996	33	10	3
110	Researcher 23	17 ANN INT ACM SIG C	1994		81	3
111	Researcher 23	P 22 M CAN ASS INF S	1994	22	264	3
112	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2008	44	340	2
113	Researcher 23	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2007	58	862	2
114	Researcher 23	NEW DIRECTIONS HUMAN	2006		13	2
115	Researcher 23	INFORM SCI KNOWLEDGE	2004			2
116	Researcher 23	JOURNAL OF DOCUMENTATION	2004	60	77	2
117	Researcher 23	P IEEE 5 INT C INF T	2004		309	2
118	Researcher 23	PROCEEDINGS OF THE ASIST ANNUAL MEETING	2004	41	213	2
119	Researcher 23	PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON INTERNET COMPUTING	2003		65	2
120	Researcher 23	ITCC 2003: INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOY	2003		145	2
121	Researcher 23	HBES 2002 INT C HUM	2002			2
122	Researcher 23	PROCEEDINGS OF THE ASIST ANNUAL MEETING	2002	39	403	2
123	Researcher 23	INFORMATION RES INT	2000	3	73	2
124	Researcher 23	P WEBN 2000 ORL FL N	2000			2
125	Researcher 23	EXPLORING THE CONTEXTS OF INFORMATION BEHAVIOUR	1999		371	2
126	Researcher 23	P 1999 CAN ASS INF S	1999			2
127	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETINGS	1999	36	665	2
128	Researcher 23	ASIS MONOGRAPH SERIES	1997		113	2
129	Researcher 23	GLOBAL COMPLEXITY CH	1996		10	2
130	Researcher 23	P COLIS 2 2 INT C CO	1996		269	2
131	Researcher 23	P 23 ANN C CAN ASS I	1995			2
132	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1995	32	77	2
133	Researcher 23	56TH P ANN M AM SOC	1993	30		2
134	Researcher 23	NEW APPROACH INFORMA	1993		67	2
135	Researcher 23	DIGITAL COLLECTIONS	2007	5	257	1
136	Researcher 23	INFORM SCI KNOWLEDGE	2006	8	170	1
137	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2006	42	1366	1

138	Researcher 23	INTERNET RESEARCH	2006	16	419	1
139	Researcher 23	ITNG	2006			1
140	Researcher 23	NEW DIRECTIONS COGNI	2006			1
141	Researcher 23	P 3 INT C INF TECHN	2006			1
142	Researcher 23	INT C INF TECHN COD	2005	2	486	1
143	Researcher 23	P IEEE 6 INT C INF T	2005		486	1
144	Researcher 23	57TH ANN M AM SOC IN	2004		16	1
145	Researcher 23	RIV RES NETW M U WOL	2004			1
146	Researcher 23	5 EURO INFORMS JOINT	2003			1
147	Researcher 23	INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY	2002		40	1
148	Researcher 23	WEB TECHNOLOGIES	2002		107	1
149	Researcher 23	INFORM TODAY	2001		545	1
150	Researcher 23	INTERNATIONAL CONFERENCE ON INFORMATION TECHNOLOGY	2001		589	1
151	Researcher 23	P 2001 INT C INF TEC	2001			1
152	Researcher 23	P 64 ANN M AM SOC IN	2001		382	1
153	Researcher 23	P AM SOC INF SCI COL	2001		3	1
154	Researcher 23	P AM SOC INFORM SCI	2001	52	226	1
155	Researcher 23	P IEEE ITCC2001 INT	2001		589	1
156	Researcher 23	PEER REV J INTERNET	2001	6		1
157	Researcher 23	INFORMATION PROCESSING & MANAGEMENT	2000	36	205	1
158	Researcher 23	INT RES 2001 INT C A	2000			1
159	Researcher 23	J AM SOC INF SCI	2000	51		1
160	Researcher 23	J INFORMING SCI	2000	3	77	1
161	Researcher 23	P 9 INT C INF KNOWL	2000		134	1
162	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETINGS	2000	37	14	1
163	Researcher 23	RES NOTE SELECTED RE	2000			1
164	Researcher 23	SUSTAINABLE SCI INFO	2000			1
165	Researcher 23	DIGITAL LIBRARIES: INTERDISCIPLINARY CONCEPTS, CHALLENGES AND OPPORTUNITIES	1999	55	1	1
166	Researcher 23	P 27 ANN C CAN ASS I	1999			1
167	Researcher 23	D LIB MAGAZINE MAR	1998			1
168	Researcher 23	P NAT ONL M NEW YORK	1998	4	375	1
169	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1998	35	3	1
170	Researcher 23	SEARCHING WEB PUBLIC	1998			1
171	Researcher 23	INFORMATION SEEKING IN CONTEXT	1997		163	1

172	Researcher 23	INTERACTION INFORMAT	1997			1
173	Researcher 23	NATIONAL ONLINE MEETING, PROCEEDINGS - 1997	1997		323	1
174	Researcher 23	DIGITAL REVOLUTION - ASIS MID-YEAR 1996	1996		64	1
175	Researcher 23	P 24 ANN C CAN ASS I	1996			1
176	Researcher 23	P 59 ANN M AM SOC IN	1996		243	1
177	Researcher 23	SIGIR 96 P ASS COMP	1996			1
178	Researcher 23	LIBRI	1995	45	203	1
179	Researcher 23	P 58 C AM SOC INF SC	1995		97	1
180	Researcher 23	PROCEEDINGS OF THE ASIS ANNUAL MEETING	1995	32	97	1
181	Researcher 23	57TH ANN M AM SOC IN	1994			1
182	Researcher 23	14TH P NAT ONL M	1993	14	38	1
183	Researcher 23	55TH P ANN M AM SOC	1992	28	249	1
184	Researcher 23	CITESEER				1
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186	Researcher 23	NEW DIRECTIONS HUMAN			229	1

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3	Researcher 24	P 6 ACM SIGMM INT WO	2004		267	7
4	Researcher 24	P ACM MULT	2005		1035	4
5	Researcher 24	IEEE INT C MULT EXP	2004		579	4
6	Researcher 24	ACM SIGMM INT WORKSH	2003			4
7	Researcher 24	28 AUSTR COMP SCI C	2005		209	3
8	Researcher 24	INFORMATION PROCESSING & MANAGEMENT	2008	44	340	2
9	Researcher 24	LECTURE NOTES IN COMPUTER SCIENCE	2006	3977	511	2
10	Researcher 24	THESIS DEAKIN U	2005			2
11	Researcher 24	COMPUTING	2008	40	11	1
12	Researcher 24	CONTENT BASED VIDEO	2005			1

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2	Researcher 25	LIBRARY QUARTERLY	2005	31	57	1
3	Researcher 25	AUSTR LIB J	1998	47	131	1
4	Researcher 25	AUSTRALIA INFORMATIO	1991			1

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3	Researcher 26	QUALITY POSTGRADUATE	1998		95	2
4	Researcher 26	THESIS C STURT U WAG	1996			2
5	Researcher 26	ALIA 2004 BIENN C GO	2005			1
6	Researcher 26	AUSTR LIB INF ASS 20	2005			1
7	Researcher 26	HIGHER ED RES DEV	2005	24	189	1
8	Researcher 26	ALIA 2004 CHALL ID	2004			1
9	Researcher 26	J LIB ADM	2001	32	331	1
10	Researcher 26	1999 REF INF SERV SE	1999			1
11	Researcher 26	OPEN DISTANCE LEARNI	1999		260	1
12	Researcher 26	1998 QUAL POSTGR RES	1998			1
13	Researcher 26	AUSTR ACAD RES LIB	1997	28	188	1
14	Researcher 26	INFORMATION NEEDS AU	1996		15	1
15	Researcher 26	NEW MODEL LIB SUPPOR				1
16	Researcher 26	P 2000 QUAL POSTGR R			215	1

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2	Researcher 28	JOURNAL OF ACADEMIC LIBRARIANSHIP	1995	21	438	8
3	Researcher 28	LIBRARY & INFORMATION SCIENCE RESEARCH	1993	15	143	7
4	Researcher 28	JOURNAL OF ACADEMIC LIBRARIANSHIP	1997	23	408	6
5	Researcher 28	LIBRARY & INFORMATION SCIENCE RESEARCH	2005	27	377	5
6	Researcher 28	LIBRARY & INFORMATION SCIENCE RESEARCH	1994	16	87	5
7	Researcher 28	LIBRARY & INFORMATION SCIENCE RESEARCH	1996	18	99	4
8	Researcher 28	LIB REV	2005	54	24	2
9	Researcher 28	ONLINE INFORMATION REVIEW	2003	27	60	2
10	Researcher 28	JOURNAL OF ACADEMIC LIBRARIANSHIP	2002	28	63	2
11	Researcher 28	LIB MANAGEMENT	2001	22	207	2
12	Researcher 28	LIBRARY TRENDS	2001	49	732	2
13	Researcher 28	AUSTR ACAD RES LIB	1997	28	198	2
14	Researcher 28	LIB INFORM SCI RES	2005	27	377	1
15	Researcher 28	LIB MANAGEMENT	2005	26	139	1
16	Researcher 28	ONLINE INFORMATION REVIEW	2004	28	241	1
17	Researcher 28	J ACAD LIBR	2003	29	411	1
18	Researcher 28	ONLINE INFORMATION REVIEW	2003	27	287	1
19	Researcher 28	ELECTRONIC LIBRARY	2001	19	232	1
20	Researcher 28	SERIALS LIBRARIAN	2001	41	99	1
21	Researcher 28	JOURNAL OF ACADEMIC LIBRARIANSHIP	1998	24	296	1
22	Researcher 28	J ACAD LIB	1997	23	412	1
23	Researcher 28	JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	1994	26	15	1
24	Researcher 28	AUSTRALASIAN PUBLIC	1992	5	3	1
25	Researcher 28	NZ LIBRARIES	1990	46	9	1

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1	Researcher 29	INFORMATION TECHNOLOGY AND LIBRARIES	2006	25	33	3
2	Researcher 29	INFORM TECHNOLOGY LI	2006	25	34	2
3	Researcher 29	OPEN SOURCE APPL SPA	2005			2
4	Researcher 29	P LIANZA C 2007 WELL	2007			1
5	Researcher 29	HAND LIT FOR ST LOUI	2004			1
6	Researcher 29	JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY	2003	54	1166	1
7	Researcher 29	NEW LIBRARY WORLD	2002	103	483	1

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1	Researcher 30	JOURNAL OF THE MEDICAL LIBRARY ASSOCIATION	2002	90	370	28
2	Researcher 30	ONLINE INFORMATION REVIEW	2001	25	311	15
3	Researcher 30	BULLETIN OF THE MEDICAL LIBRARY ASSOCIATION	1997	85	348	11
4	Researcher 30	LIBRARY TRENDS	2001	491	662	9
5	Researcher 30	GOVERNMENT INFORMATION QUARTERLY	2000	17	243	9
6	Researcher 30	JOURNAL OF ACADEMIC LIBRARIANSHIP	1995	21	438	8
7	Researcher 30	HLTH INFORMATION LIB	2004	21	3	7
8	Researcher 30	ELECTRONIC LIBRARY	2003	21	247	7
9	Researcher 30	LIBRARY & INFORMATION SCIENCE RESEARCH	1993	15	143	7
10	Researcher 30	HLTH INFORM LIB J	2003	20	195	5
11	Researcher 30	LIBRARY & INFORMATION SCIENCE RESEARCH	1994	16	87	5
12	Researcher 30	LIBRARY & INFORMATION SCIENCE RESEARCH	1996	18	99	4
13	Researcher 30	PROCEEDINGS OF THE 2ND NORTHUMBRIA…	1998		3	3
14	Researcher 30	JOURNAL OF ACADEMIC LIBRARIANSHIP	1992	18	152	3
15	Researcher 30	HEALTH INFORMATION AND LIBRARIES JOURNA	2007	24	1	2
16	Researcher 30	HLTH INFORM INTERNET	2006			2
17	Researcher 30	INTERLIBRARY LOAN SE	2004			2
18	Researcher 30	J ACAD LIBRARIANSHIP	1995	21	445	2
19	Researcher 30	HLTH INFORMATION INT	2006			1
20	Researcher 30	HLTH ED	2005	54	231	1
21	Researcher 30	HLTH INFORMATION INT	2005			1
22	Researcher 30	LIB REV	2005	54	231	1
23	Researcher 30	JOURNAL OF ACADEMIC LIBRARIANSHIP	2004	30	330	1
24	Researcher 30	ELECT LIB	2003	21	47257	1
25	Researcher 30	ADDRESSING DIGITAL D	2002			1
26	Researcher 30	8 INT C MED LIBR 200	2001			1
27	Researcher 30	COMMUNICATION	2001			1
28	Researcher 30	ED LIB INFORM SERVIC	1997	14	3	1
29	Researcher 30	HLTH LIBRARIES REV	1995	12	173	1
30	Researcher 30	J ACAD LIBRARIAN NOV	1995		438	1
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4	Researcher 31	LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	2004	28	249	1
5	Researcher 31	CREATING DIGITAL BAB	2002			1
6	Researcher 31	P 67 IFLA COUNC GEN	2001		1	1
7	Researcher 31	LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	2000	24	73	1
8	Researcher 31	LIBRARY & INFORMATION SCIENCE RESEARCH	1994	16	279	1
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6	Researcher 32	DIGITAL FACTOR LIB I	2002			6
7	Researcher 32	INT YB INFORMATION L	2000		314	5
8	Researcher 32	LIBRARY ACQUISITIONS-PRACTICE AND THEORY	1998	22	147	5
9	Researcher 32	SERIALS LIBRARIAN	1989	17	45	5
10	Researcher 32	GUIDE CURRENT NATION	1987			5
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12	Researcher 32	PRESERVATION MANAGEM	2006			4
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16	Researcher 32	QUALITATIVE RES INFO	2004			3
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18	Researcher 32	ONLINE INFORMATION REVIEW	2002	26	335	3
19	Researcher 32	COLLECTION MANAGEMEN	2000			3
20	Researcher 32	LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	1999	23	149	3
21	Researcher 32	THEOLOGICAL RELIG RE	1984	3		3
22	Researcher 32	LIBRI	1983	33	177	3
23	Researcher 32	ONLINE INFORMATION REVIEW	2007	31	273	2
24	Researcher 32	ONLINE INFORMATION REVIEW	2005	29	581	2
25	Researcher 32	ONLINE INFORMATION REVIEW	2005	29	225	2
26	Researcher 32	IFLA J	2003	29	288	2
27	Researcher 32	NEW LIB WORLD	2002	103	436	2
28	Researcher 32	INFORMATION SERV ELE	2001			2
29	Researcher 32	INT YB INFORMATION L	2001			2
30	Researcher 32	LIB MANAGEMENT	2000	21	373	2
31	Researcher 32	LIBRI	1999	49	1	2
32	Researcher 32	QUALITATIVE RES INFO	1998			2
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34	Researcher 32	LIBRARY ACQUISITIONS-PRACTICE AND THEORY	1990	14	389	2

35	Researcher 32	LIBRI	1988	38	297	2
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38	Researcher 32	GOVERNMENT PUBLICATIONS REVIEW	1979	6	1	2
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40	Researcher 32	ONLINE INFORMATION REVIEW	2008	30	481	1
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49	Researcher 32	LIBRARY COLLECTIONS ACQUISITIONS & TECHNICAL SERVICES	2002	26	253	1
50	Researcher 32	SERIALS LIBRARIAN	2001	41	99	1
51	Researcher 32	IFLA J	2000	26	115	1
52	Researcher 32	LIB CONSORTIUM MANAG	2000	7	135	1
53	Researcher 32	LIBRI	2000	50	98	1
54	Researcher 32	65 IFLA COUNC GEN C	1999			1
55	Researcher 32	ED LIB CHINA	1997		143	1
56	Researcher 32	LIB COLLECTION DEV P	1996		8	1
57	Researcher 32	LIBRARY ACQUISITIONS-PRACTICE AND THEORY	1993	17	333	1
58	Researcher 32	CIS1 CTR INF STUD RE	1992			1
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60	Researcher 32	AUSTR ACAD RES LIB	1990	21	137	1
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64	Researcher 32	COLLECTION MANAGEMEN	1988			1
65	Researcher 32	LIBRARY ACQUISITIONS-PRACTICE AND THEORY	1988	12	29	1
66	Researcher 32	AUST COLL LIB	1986	4	161	1
67	Researcher 32	ED LIB AUST	1986	3	39	1
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71	Researcher 32	INTERNATIONAL LIBRARY REVIEW	1985	17	203	1
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75	Researcher 32	INTERNATIONAL SOCIAL SCIENCE JOURNAL	1978	30	929	1
76	Researcher 32	THESIS U LONDON	1978			1
77	Researcher 32	GUIDE LIBRARY	1976			1

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4	Researcher 33	ASLIB PROCEEDINGS	2000	52	58	4
5	Researcher 33	ELECT LIB INFORM SYS	2006	40	372	2
6	Researcher 33	DESIGN USABILITY DIG	2005		282	2
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8	Researcher 33	P 3 INT C AS DIG LIB	2001		88	2
9	Researcher 33	062000 TRIS SCE NAN	2000			2
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