

What evidence is there to support the employment of trained and professionally registered library, information and knowledge workers?

A systematic scoping review of the evidence

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1 Introduction, aims and objectives

This report seeks to provide evidence that CILIP can use to advocate on behalf of the information professions.

The report addresses three aims:

1. To create an initial evidence base which can be used to advocate on behalf of the information professions.
2. To develop clear propositions outlining the value that trained and professional registered staff provide.
3. To identify options for further research which can be commissioned by CILIP

It will do this by:

1. Reporting on a systematic scoping review of the literature to identify the evidence base for trained and professionally registered library, information and knowledge (LIK) workers
2. Mapping the evidence according to library sector
3. Identifying which evidence bases need updating
4. Drawing up a set of propositions from the results of the review and mapping
5. Identifying further research needed and what methods could be used to achieve this.

2 Methods

2.1 Systematic scoping review of the literature

A systematic scoping review of the literature was conducted to identify the evidence base for trained and professionally registered LIK workers. The objectives of the review were:

- To identify and summarise the research which provides an evidence base for trained or professionally registered library, information or knowledge workers
- To identify evidence according to sector
- To identify the research methods used

The review sought to examine all library/information/knowledge sectors and include international literature. To remain within the resources and time frame allocated by CILIP, the data was extracted to provide a map of the evidence, but not critically appraised in detail.

The review was undertaken following the framework proposed by Arksey and O'Malley (2005). Scoping studies seek to provide in depth and broad results, and take an iterative and reflexive approach (Arksey and O'Malley, 2005). The scoping review framework has been used for conducting scoping studies of complex health care interventions, the nature of which can be seen as comparable to interventions in library and information Science (LIS) (i.e. the interventions have a number of interacting components, different behaviours are required from those delivering or receiving the intervention, variability in possible outcomes, and there is a degree of flexibility or tailoring of the

intervention (Hawes, 2004; Craig et al., 2008). According to Arksey and O’Malley (2005) systematic scoping reviews are appropriate to:

1. “Examine the extent, range and nature of research activity and provide a way of mapping fields of study
2. Determine the value of undertaking a full systematic review
3. Summarise and disseminate research findings
4. Identify research gaps in the existing literature”

These elements mapped onto the scope of the brief and the project deliverables as outlined in the objectives above, and thus were determined as an appropriate method of conducting the study.

The remainder of this section describes the approach taken, following Arksey and O’Malley’s framework (2005). Initial scoping searches were conducted (Koufogiannakis and Brettell, 2015), which indicated a lack of high level review evidence on the effectiveness and impact of LIS services across most library sectors. This suggested a need to locate a range of individual studies across library sectors to inform the review findings.

2.2 Stage 1: Identifying the research question

The final research question was agreed in discussion with CILIP to be: What evidence is there to support the employment of professionally trained or registered library, information and knowledge staff? This included the identification of studies that demonstrated the effectiveness, value or impact of libraries and LIK workers across sectors. In conjunction with CILIP the project team agreed definitions for library, information and knowledge workers and libraries; value, impact and effectiveness; trained and professional to ensure that the work had a suitable focus. The sectors to be covered were also agreed with CILIP. These definitions and the sectors can be found below.

Definitions	Sectors considered
Professionally trained - academic qualification such as BA, Masters in relevant subject OR professionally registered (chartership, certified or fellowship)	Armed forces Commerce/Business (Inc. Industry/Science) Consulting Further Education Government – Local Government – National Health Care Social Care Higher Education Law Museums, Archives and Galleries National Library Not for Profit/Third Sector Prison Public Library Research and Academia School (Primary)
Effectiveness or effects – outcomes demonstrating whether a service works	
Impact – outcomes measuring whether a service makes a difference	
Value – outcomes related to costs, economics, value for money, extrinsic value, savings	

	School (Secondary)
Table 1: Definitions and sectors	

2.3 Stage 2: Identifying relevant studies

2.3.1 Literature searches

A comprehensive and iterative approach to the literature searches for evidence was taken due to the broad nature of the brief, the need to identify evidence from a range of study designs and in line with the scoping review framework. As LIK professionals work across disciplines, the search incorporated resources that reflected these disciplines at the same time as taking a pragmatic approach to meet the required deadlines and resources committed. A protocol that outlined the resources to be searched, search terms and search parameters was developed by the project team following discussions and in liaison with CILIP.

2.3.2 Resources searched

The search built on the approach taken in a recent review (Koufogiannakis and Brettle, 2015) that included LISA, LISTA, Library Literature, Scopus, Medline and Cinahl. The review findings and searches (Koufogiannakis and Brettle, 2015), together with the advocacy resources provided on CILIP's web pages (<http://www.cilip.org.uk/cilip/advocacy-awards-and-projects/advocacy-and-awards>) also provided useful starting points. These approaches were supplemented with a focussed Internet search of key relevant organisations, a search of Ethos to identify relevant doctoral theses and a hand search of the Evidence Based Library and Information Practice Journal. A summary of the resources searched can be found in Appendix 1.

2.3.3 Search terms

The review question was broad with the potential to encompass a wide range of LIK services, which in turn led to a wide search encompassing a range of thesaurus and free text terms to describe the services and different aspects services in question. Initial scoping searches indicated the need for a sensitive search approach followed by sifting to ascertain relevance. Search terms were identified from a recent review (Koufogiannakis and Brettle, 2015) and discussions amongst the project team and CILIP.

2.3.4 Process of searching

The search followed the agreed protocol and was undertaken by the project team. Results of the searches were stored on Endnote web reference management software to enable sharing across the project team. The group function was used to enable the team to track references throughout the systematic review process and notes were added to each record to justify inclusion and exclusion decisions made. Search strategies were recorded, together with details of the date the search was undertaken and the number of results obtained and issues arising during the searching in order to provide a complete history of the search process and provide transparency of the review process. This information was stored on a project wiki in PBWorks.

2.4 Stage 3: Study selection

2.4.1 Inclusion and exclusion criteria

The inclusion/exclusion criteria were refined via discussion amongst the project team and CILIP following scoping searches as follows:

Inclusion criteria:

- Studies that assess the effects, value or impact of any library/information/knowledge management intervention or service. (Table 1)
- Library, information, knowledge or IT workers whose work relates to information or knowledge which needs to be organised or use of a system in which the information is located
- Roles which include archives or study records
- Evidence of measurable outcome (e.g. time saved, improved business, improved patient care, improved grades, impact on community)
- All types of evidence (including experimental or observational evaluation studies with controlled or uncontrolled prospective design or controlled retrospective design, return on investment, cost analysis, correlational studies)
- Studies in English

Exclusion criteria:

- Interventions which are provided by information workers that relates to information systems and how these work
- Descriptions of interventions/services with no evaluation component or measurable outcomes
- Studies which only include process type outcomes such as user satisfaction, numbers of users, books loaned etc.
- Archivists
- Evaluation or impact theory testing
- “How to” articles on measuring performance, impact, evaluation, value
- Citation impact analysis and methods of citation impact
- Studies in languages other than English

2.4.2 Outcomes considered

Measuring the outcomes or impact of library services is difficult as the outcomes are often diffuse or will be realised over a long term. It has been argued that it makes more sense to measure the effectiveness or impact of the contribution made by libraries rather than a direct outcome (Abels et al., 2002; Urquhart, 2004; Brettle et al., 2011). The outcomes considered took this into account and thus could include for example,

- Measures of time saved
- Measures of money saved
- Measures of outcomes relevant per sector (e.g. impact on patient care – health, impact on community – public libraries, impact on assessment – academic)

2.4.3 Screening/Sifting of studies

The broad nature of the search question and sensitive approach to searching located a high volume of potentially useful studies. On the basis of titles and abstracts, each potentially relevant study was screened by one of a team of reviewers against the inclusion/exclusion criteria. Two reviewers to ensure inter-rater reliability screened a 20% sample of studies; a set of 91 studies that were deemed as “maybe or potentially relevant” were screened by CILIP. Those studies that were clearly irrelevant were immediately excluded, and full papers obtained for those studies where it is impossible to tell from the title and abstract. Full papers were accessed for all those meeting the inclusion criteria and these studies proceeded to the next stage of the review.

Figure 1 explains how the located studies passed through the searching and sifting process

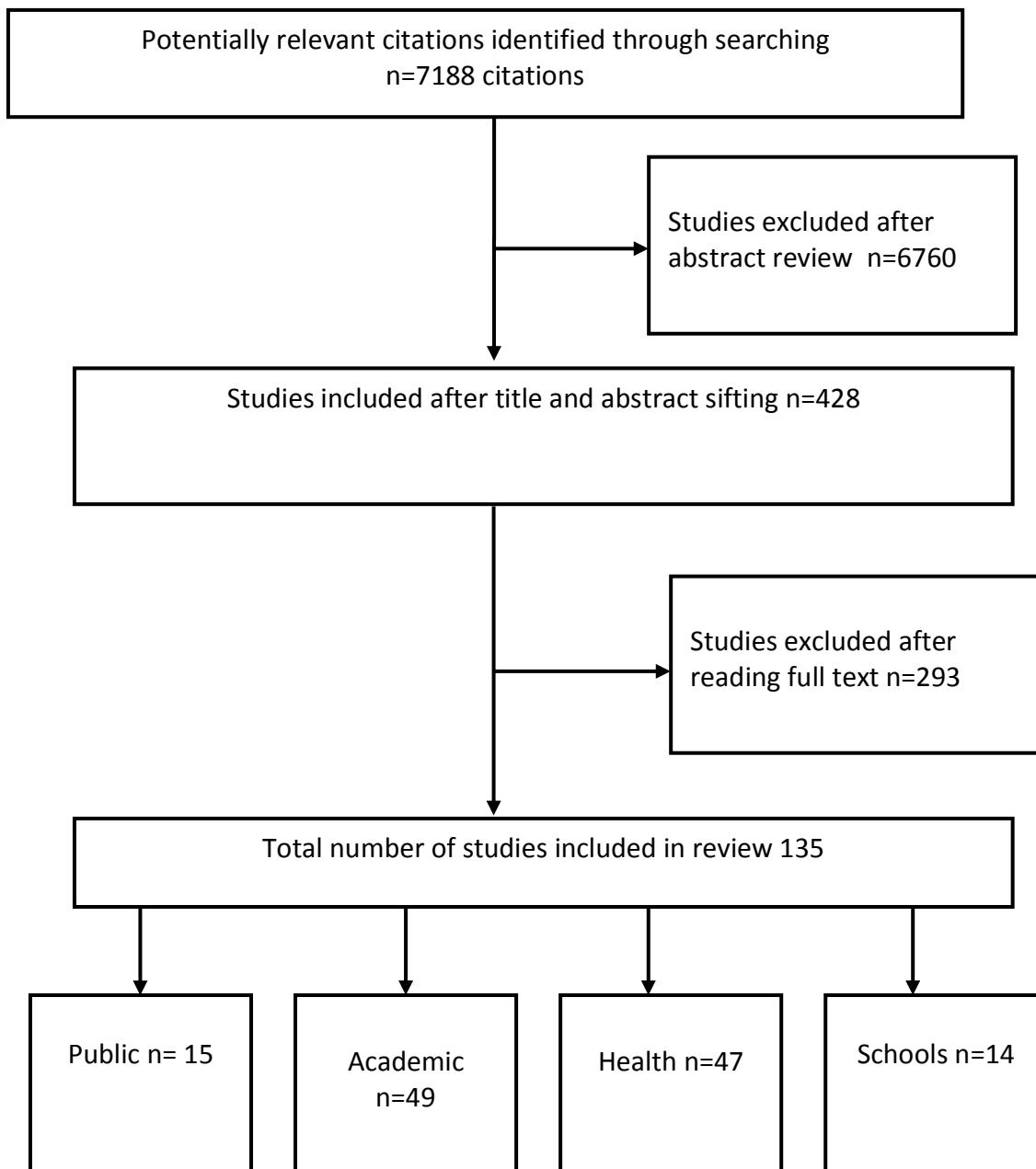


Figure 1: Searching, sifting and extracting process

2.5 Stage 4: Charting the data

This stage of the review involved extracting key elements of the papers to provide an overview or map of the evidence contained in each paper. These elements included:

1. Author details and date
2. Country
3. Aims of study
4. Library sector
5. Evidence of professional or trained or registered staff
6. Study design

7. Outcomes measured
8. Key findings

These were recorded in tabular form in excel spreadsheets and then converted into the evidence tables in Appendix 3.

2.6 Stage 5: Collating, summarising and reporting the results.

Separate tables were created to summarise the evidence in each library sector (Appendix 3, for summaries). These were used to provide an overview for each sector area, highlight studies of note and develop the propositions. Although no library sectors were excluded from the search, not all sectors provided evidence that met the inclusion criteria of the review. Therefore the evidence presented below represents only a small number of library sectors: public, schools, health and academic which generated evidence of clear outcomes in relation to the value of trained professional LIK workers.

Within each evidence table (or sector), studies are numbered; these numbers are used in the propositions to refer to the studies that contribute to each proposition. Illustrative examples from the findings of key studies (selected on the basis of quality of evidence (based on study design) or applicability to the UK setting) are provided under each proposition. These aim to illustrate the nature and extent of each impact.

3 Findings

3.1 Public Librarians

3.1.1 Overview

Fifteen studies were included which used a range of study designs: economic evaluation, qualitative, mixed methods, a literature review and a meta-analysis. The majority of studies were conducted in the US, and there may be some issues regarding transferability of the results to a UK setting (Arts Council England, 2014).

A wide range of outcomes were measured including: Return on Investment (ROI), learning, change in knowledge, change in activity, reading levels, attitudes to reading, impact on education, personal development, skills and employability, health and well being, community cohesion, self esteem, social inclusion and information needs.

In two studies it was clear that the work related to professionally trained librarians, in 11 studies it was assumed and in two studies it was unclear. However, all the included studies were about libraries, rather than professionally qualified or trained librarians. Many of the studies were examining the impact of large-scale library projects or libraries, therefore it could be assumed that professionally qualified librarians had been involved and some of the impacts would be due to the librarians as well as the services the librarians provided.

Studies fell into 3 main categories:

- Return on investment (ROI)

- Social and community impacts
- Impact on reading

3.1.2 Studies of note

Aabo (2009) conducted a meta-analysis of ROI studies that provides an overview of the international literature on ROI, Becker et al (2010) conducted a large scale mixed methods study providing good quality evidence of impact of Public Access Computers in US public libraries (known as the US Impact Study), and a literature review by BOP Consulting for Arts Council England (2014) provides an overview of evidence applicable to UK public libraries and uses logic models to highlight direct and indirect impacts to which libraries contribute.

3.1.3 Propositions

Public librarians contribute to:

A good return on investment^{1, 3,4,9,10,12}

- “The ROI mean and median for all public libraries are 4.5 and 4.4, respectively (i.e. For every dollar spent the return is 4.5 or 4.4 dollars)” (Aabo, 2009,p.320)
- “The economic value the British Library delivers for society is £5 for every £1 invested. The Library generates a net economic value of £419m for its users and UK society as a whole. Accounting for value placed on the Library internationally, the benefit cost ratio is 5.1.The value of the Library’s Reading Rooms as estimated by their users is £70m per annum, including over £20m for the Business & IP Centre which was launched in 2006.The value that the public places on the continued existence of the Library is £412.8m per annum.”(British Library, 2013, p.1; Tessler, 2013;)

Helping people improve their education, health, employment prospects and their sense of belonging to a community.^{2,5,6,7,8,12,13,14,15}

- “58 people responded to the impact questions: 79% Learned something new, 28% Became interested in a new topic, 45% Understood something more clearly, 66% Triggered memories or experiences, 19% Improved computer skills, 24% Decided to go and look at original material, 0% None of the above. “ (Anderson, 2007, p.380)
- “Many of these benefits had a positive impact on participants' individual assurance and self-esteem; the groups also had positive consequences for social inclusion and involvement in the local community and economic activity. Benefits were shown to stem from the social nature of the groups, the texts read, and from the unique experience of shared reading as a creative, collaborative, and interpretive act.” (Walwyn and Rowley, 2011, p.302)
- “Nearly 1/3 of the U.S. population over the age of 14 used library Internet computers and those in poverty relied on these resources even more. Internet access is now one of the most sought after public library services, and it is used by nearly half of all visitors. Over the past year, 45 % of the 169 million visitors to public libraries connected to the Internet using a library computer or wireless network during their visit, even though more than three- quarters of these people had Internet access at home, work, or elsewhere.” (Becker et al., 2010, p.1)

- “Apart from addressing their own computing needs, nearly 2/3 of library computer users (63 %) logged on to help others. 56% reported helping friends or family with health matters, 46 % helped find information on education and learning opportunities, and 37 % helping friends or family find employment or career information. An estimated 48 million people reported using library computers and Internet access to helping their friends, family, co-workers, and even strangers with a wide range of problems, from resolving tax questions to finding medical equipment.” (Becker et al., 2010, p.4)
- “The findings show considerable evidence of National Year of Reading related activities in supporting the three first-tier social outcomes: 'Stronger and Safer Communities', 'Health and Well-Being' and 'Strengthening Public Life.’” (Rankin, 2012, p.7)

Improved attitudes to reading and potentially improving reading ability.^{6, 8,13}

- “Students who reported participating in a public library summer reading programme started with higher reading scores and stayed ahead of those who did not participate” (Roman et al., 2010, p.48)
- “The majority (74.6%) of parents/caregivers experienced a gain in confidence and competence in using story-time materials and activities due to their participation in the program, The majority (88.1%) of parents/caregivers reported that they are using what they learned at home and this has continued over the longer term.” (Graham and Gagnon, 2013, p.117)

3.1.4 Areas for further research

1. A large scale UK wide study which replicates the US IMPACT study by Becker et al., (2010)(i.e., mixed methods examining numbers of people using libraries, what they use the library for and what happens as a result of their library use e.g.: how many use the library computers to for example write cvs, look for employment and whether this leads to an interview or job offer). This study also developed a toolkit that can be used at a local level. The development and implementation of such a toolkit on the back of a national study would enable the collection of a common data set of outcome information which would help build a national evidence base for public libraries.
2. Studies that focus on outcomes not outputs (outcomes may need development first), which are longitudinal and/or larger in scale
3. Systematic reviews of the evidence on particular public library related questions, e.g. do public libraries improve health and well being? Do public libraries improve reading? Or do public libraries improve education?
4. Empirical studies that examine the impact of public libraries on reading, literacy (including health literacy), employability, physical well being, mental well being, community trust and cohesion or digital inclusion are needed.
5. Mixed methods approaches have proven effective in other sectors (e.g. academic and health) and may provide a useful approach in the public library sector.

3.2 School Librarians

3.2.1 Overview

Fourteen studies were included, which were mainly conducted in the US; only one empirical study was conducted in the UK but only reports pilot data (Gildersleeves, 2012). Most used a mixed methods design, including two that used the critical incident technique. A series of studies undertaken in different states throughout the US, used correlational techniques to link libraries with student achievements. There were also two literature reviews.

Included studies focussed on measuring the impact of libraries on student achievement, student engagement and reading skills. A number of studies also looked at librarian and teacher collaboration and stakeholder views of what was effective in a school library service.

Outcomes measured included student achievement, reading, motivation and how the library contributes (or helps) the student with a general trend that schools that have a professionally staffed library impact on reading, learning and achievement.

It was clear in two studies that the evidence was regarding professionally trained library staff and it was assumed in the remaining studies.

The majority of studies looked at secondary schools rather than primary education and there was a lack of studies that focussed on information literacy or digital skills.

3.2.2 Studies of note

Gildersleeves (2012) was a UK pilot study that combined the approach from some of the larger US studies to develop appropriate UK tools. The study had promising results and developed tools and techniques for use in a later wide scale study, (but no results of the wider study have been published to date). The study by Todd and Kulthau (2003) also known as the Ohio study was a very large scale, high quality mixed methods study that measured multiple outcomes of how the school librarian (or library media specialist) can contribute within a school and to the student experience and achievement. Finally a series of studies by Lance and colleagues (Francis and Lance, 2010; Lance et al., 2010; 2012) has provided a methodology and correlational evidence of the links between a professionally staffed library and student achievement as measured by reading and other assessment scores. Much of this research is summarised and discussed by Williams et al., (2013) who provides details of the implications for Scotland and a graphic representation that can be used for advocacy.

3.2.3 Propositions

Schools librarians contribute to:

Improved student achievement^{1, 3,4, 6,10, 11,12, 14}

- “One of the most effective outcomes has been the increase in student achievement scores on the Connecticut Academic Performance Test (CAPT); this increase appears to have resulted from collaboration on assured experiences between library media specialists (school librarians) and science teachers. The percentage of students meeting state goals on the science portion of CAPT has increased to 80.7% compared to 75% the previous year” (Snyder and Roche, 2011, p.24)
- “Over half of the students (52.5%) said that the school library was quite or most helpful in helping them get better grades in their projects and assignments. Almost 3,000

student statements expressed a relationship between what the library has done for them and getting a good grade” (Todd and Kulthau, 2003; p.13)

Positive pupil engagement^{4, 5,6,7,10,14}

- “Findings from the pilot phase supported the hypothesis that a correlation may be traced between good library provision and positive pupil engagement with reading and information skills.” (Gildersleeves, 2012, p.303)

Improved reading skills^{3, 4,6,7,10,14}

- “For all 12 library measures, students with access to —a better-staffed, funded, equipped, and stocked, and more accessible school library—are more likely to score advanced and less likely to score below basic on the PSSA Reading and Writing tests.” (Lance and Schwarz, 2012, pii)
- “The measure that correlated most closely with library program principles was standardized reading scores. The following principles were positively correlated at the .01 significance level to three measures of student academic achievement (reading scores, API, rank): collaborative planning, program planning, administrative support, and program communication” (Farmer, 2006)
- “Elementary schools with at least one full-time endorsed librarian averaged better CSAP performance than those with less than one full-time endorsed librarian. Elementary schools that spent more on their libraries averaged better CSAP reading performance than those spending less.”(Francis and Lance, 2011, p.64)

Facilitating student learning^{2, 3, 9, 10, 12,14}

- “69 per cent of students visit their school library at least once a week, and most to do research” (Small and Snyder, 2010, p1)
- “99.44% indicated that the school library and its services, including roles of school librarians, have helped them in some way, regardless of how much, with their learning in and out of school.” (Todd and Kulthau, 2003, p.5)
- “25.54% said that the library has helped them, regardless of how much, with their learning on all 48 statements. 60.3 % said that the school library has helped them in some way, regardless of how much, on at least 43 of the statements.” (Todd and Kulthau, 2003, p.5)

3.2.4 Areas for further research

1. There is a significant lack of studies conducted in the UK; evidence for all of the above proposition areas is needed for the UK. Replicating the designs used in the Lance studies or the Todd and Kulthau (Ohio, 2003) study would make useful starting points, as would publications of the findings from Gildersleeves (2012) larger scale study.
2. Studies are needed on the impact of librarians at primary school level.
3. Systematic reviews that bring together the evidence in a rigorous way would provide a baseline of the evidence available and clearly highlight the gaps where research is needed. These should be focussed around specific questions e.g. Do school librarians improve student reading ability? Do school librarians contribute to student engagement?

4. More qualitative research or case studies are needed to help understand the links between the quantitative (correlation) evidence and how librarians actually make a difference.

3.3 Health Librarians

3.3.1 Overview

Forty-seven studies were included that looked at the impact of health library services. Surveys were the most common method used to measure impact, but with an increasing number of mixed-method studies supplementing a survey with interview or a critical incident technique, in order to capture specific instances of impact. In addition, a number of high levels of evidence measuring impact were found including 8 systematic reviews and 3 randomised controlled trials. Other study designs include an economic analysis; literature review, rapid review and prospective observational study were undertaken.

Nineteen of the studies were undertaken in the US, 15 in the UK, with the remainder undertaken in Canada, New Zealand, Italy and Pakistan. Six of the 8 systematic reviews were undertaken in the UK. The acute hospital setting was the focus for the majority of the studies.

Included studies measured the impact of literature searches and/or information skills training provided by professionally qualified librarians, the majority of which focused on the impact of clinical librarian services. Just over half of the included studies measured the impact of health libraries in general, therefore as studies in other library sectors, it could be assumed that professionally qualified librarians had been involved and that the librarians rather than the services themselves would have contributed some of the impacts.

Outcomes measured tended to be quite focused on specific aspects relating to impact on the delivery of healthcare, on patient care, on the organisation and on the health professional.

- Clinical decision-making (Diagnosis, choice of assessment/test, choice of intervention)
- Patient centred care (Improved healthcare outcomes, advice to patient/carer, reduced length of stay, improved quality of life for patients/carers, increased patient involvement/ shared decision making, improved patient experience, improved patient access to information)
- Risk management & safety (Improve patient/staff safety, avoidance of referral/readmission/ clinical test/hospitalisation/medication errors, legal/ethical issues, improve accountability/ transparency of services)
- Quality of care (Meet quality standards, improved quality care, interventions based on best practice or current evidence, evaluation or audit, innovative practice)
- Service development or delivery (Address inequalities in access to care or unmet service need, service development or delivery underpinned by evidence base, working with other health and social care providers, commissioning/decommissioning of services, development or revision of care pathways, guidelines or protocols)
- Continuing professional development & research (Delivering/supporting education or training staff, supervision/leadership, gain qualifications, support research, comply with requirements of regulatory bodies, update knowledge/skills)
- Efficiency/cost-effectiveness (Saved time, support organisation financial strategies, business development)

It was clear in 33 studies that the evidence was regarding professionally trained staff, in 14 this was assumed and in one study it was unclear.

3.3.2 Studies of note

Eight systematic reviews^{6, 7, 18, 32, 39, 44, -46} and RCTs(*Randomised Controlled Trials*)^{16, 24, 30} clearly demonstrate the positive impact of the health librarian/library services across multiple outcomes. However, it was not possible to tell whether the evidence directly measured the impact of being a 'professional' librarian as opposed to a 'trained' librarian.

The evidence base demonstrating the impact of health librarians is strongest for outcomes relating to CPD, clinical decision-making and time saved. Each literature search provided by a health librarian impacts on multiple outcomes throughout their organisation thus highlighting the complexity of the evaluation process.

3.3.3 Propositions

Health librarians contribute towards

Improved clinical decision making^{1, 3-10, 12, 13, 15, 19, 22, 25, 28-32, 37, 41-43, 45, 46}

- “The largest most specific impact reported was that CLs (*Clinical Librarians*) have a positive effect on better informed decisions; this was found in 12 studies (67%).” (Brettell et al., 2010, p.17)
- “The cognitive impact of the provided information on participants' decision-making is reported in Table 4. Of the responses provided to intervention questions, participants rated 63% as having a highly positive impact” (McGowan et al., 2008)

Improving patient centred care^{2, 3, 5-10, 12, 14, 15, 19, 24, 25, 27-29, 31-33, 37, 38, 40-45}

- “The cumulative evidence supporting the conclusion that CML (*Clinical Medical Librarian*) services have contributed to improved patient care by their health professional users is also relatively strong. This evidence includes 20 studies, 41 results statements, and a relatively large number of individual users (837) and uses (361) studied.” (Wagner & Byrd, 2004, p.30).
- “75% of those in patient-facing roles had used the training in patient care. The most frequent use was to inform choice of treatment (28%), followed by advice given to patients/carers (27%), and guideline and pathway development (23%)” (Ayre, 2015, p.54)
- “Of the 27 respondents who reported an immediate impact on the treatment or management of a patient, six (22.2%) said the information provided by the HSL (*Health Services Librarian*) determined their choice of drug(s), eight (29.6%) said the information confirmed their proposed choice of drug(s) used, and five

(18.5%) said the information changed the choice of drug(s) used.” (Farrell & Mason, 2014, p.118)

Aiding risk management & safety^{3-5, 7,8,10,15,19,25,28,31,39,41,46}

- “A quarter reported direct impact in improving patient and staff safety (n=85, 25%) as well as in risk management (n=79, 23%)...*“I would say so because if a child gets their head trapped in a bedrail, that’s going to have a huge impact on the financial situation of the Trust through litigation”.* (Nurse, Acute)”. (Brettle et al., 2015, p.26)
- “A number of key outcomes related to patient safety such as misdiagnosis (13%), adverse drug reaction or interaction (13%), medication error (12%), and hospital acquired infection (3%) were all listed by respondents as outcomes that were avoided as a result of the information.” (Marshall et al., 2013, p.41)

Improving quality of patient care^{4, 7,8,22,25,28,37,41-43}

- “All respondents who had used the CML service indicated that the information they received was relevant, accurate, current, of clinical value, and contributed to higher quality care.” (Vaughan 2009, p.149)
- “When asked directly if the library-provided information contributed to a higher quality of care, more than 56% of survey respondents agreed that it did.” (Bayrer et al., 2014, p.246)

Health service development or delivery^{2, 4,5,8-10,15,18,28,40,42,}

- “29% of respondents indicated they had implemented learning for service development and planning activities, and 24% for guideline and pathway development.” (Ayre et al., 2015, p. 57)
- “Evidence of more immediate impact was also reported for service development (127, 37% critical incidents) and working with other health and social care providers (99, 29% critical incidents), providing integrated care and addressing inequalities or an unmet need in care. Contributions to immediate service developments were also reported in the interviews across the acute and community sectors” (Brettle et al., 2015, p. 24)

Helping to demonstrate efficiency/cost-effectiveness (including saving health professionals time)^{2,4,5,7-9,12,19,24-26,28-32,35,37-39,41-46}

- “The research examining librarians providing literature searching as a service,^{25 39 43 44 46} showed a positive effect on decreasing the time to providing relevant information for clinical decision-making^{43 44 46} and decreased the length of hospital stay.^{25 39}.” (Perrier et al., 2014, p1122)

- “Although the numbers are relatively small, clear evidence is provided where clinical librarians are contributing to reduced costs by impacting on LoS (*Length of Stay*) (40 incidents, 12%) and avoidance of referral, tests or readmission (55 incidents, 16%).” (Brettle et al., 2015)
- “There is also evidence, notably from the clinical librarian studies, of time savings to health-care professionals and cost-benefits. Of two studies attempting to measure the costs of the clinical librarian service, one found that the cost per question was approximately equivalent to that of a chest radiograph.⁴² Another estimated a cost saving of a clinical librarian versus a consultant search of £26 per hour in 2002.³²” Weightman & Williamson, 2005, p. 17).

Assist healthcare professionals in pursuit of CPD^{1-3, 5,6-10,13,15-20,22-25,28,30,32,33-36,38,40-42,44}

- “98% of respondents saw a benefit in their teaching or learning following an information skills training session.” (Ayre et al., 2015, p.57)

3.3.4 Areas for further research

1. From a wider perspective, more impact evaluation is required in the non-acute setting (community, primary care, outreach library services)
2. Impact from an organisational perspective needs to be considered over the longer term
3. There is a gap in how health librarians can impact on the knowledge management activities of the organisation
4. Further studies should examine the cost-effectiveness of health library services
5. There is a need for a more tailored approach to measuring impact that is closely aligned to their stakeholder objectives
6. Using quantitative methods alone and narrowing the focus of an impact study may well result in underestimating the contribution of the health librarian, therefore future research should consider a mixed-methods approach
7. Interviews are essential for illustrating the complexity of the impact incidents
8. Standards for reporting impact evaluation studies need to be improved

3.4 Academic Librarians

3.4.1 Overview

Forty-nine studies were included on academic libraries and these were mainly from the US, although a small number took place in the UK. One of the main foci of studies was on the evaluation of information literacy programmes and methods of teaching information literacy. A second focus of studies was the impact of the library on student achievement or retention. This was measured by examining the money spent on the library or the use of the library by students and correlating this with student grades or final degree or whether they returned for further years of study. A number of studies also examined the impact of the library on academic research or researchers.

A range of study designs were employed, often pre and post-test or quasi-experimental studies for information literacy. Many of the pre and post-test designs were limited and also restricted to singular

one-shot courses that limited their generalisability. Only one randomised controlled trial was located (Brettle and Raynor, 2013). Three systematic reviews have been conducted in relation to information literacy (Koufogiannakis and Weibe, 2006; Zhang et al., 2007 and Weightman et al., 2015). The latter has not yet been formally published, but has been included here as it provides up to date high quality evidence and suggests there is no need for further information literacy studies of certain types. For studies that examined the impact of the library on student achievement or retention correlational analyses using library and university statistics were used. A small number of studies used mixed methods, so information on how the library actually contributes to some of the outcomes on which impact claims are made are lacking.

It was clear in 11 studies that the evidence was about professionally trained staff and it was assumed in the remaining 37 that the staff were professionally trained.

3.4.2 Studies of note

Two well-conducted mixed methods studies demonstrate the value of UK libraries on research and researchers, as well as highlighting promising methodologies (RIN and RLUK, 2011) and Tenopir et al., (2012)¹. Stone et al., (2012) demonstrates a link between use of library resources and student achievement across 8 UK Universities. There are a number of systematic reviews (Koufogiannakis and Weibe, 2006; Zhang et al., 2007; demonstrating the effectiveness of information literacy interventions, as well as a randomised controlled trial (Brettle and Raynor, 2013) which demonstrates the effectiveness of information literacy teaching over the short and medium term. Kingma and McClure (2015) demonstrate that the ROI method can be transferred to academic libraries. Emmons and Wilson (2012) and Haddow (2013) show how institutional data can be used to demonstrate the impact of the library on retention. Finally a comprehensive review of the literature funded by the ACRL (Oakleaf, 2013) is available but not included in the evidence tables, as it does not report the outcomes of each study in a way that could be easily represented in the evidence tables in the time available.

3.4.3 Propositions

Academic librarians contribute to:

Improved retention^{15,22,40}

- “The only variable which made a significant impact on retention and graduation was the number of professional library staff. This equated to a 10 per cent increase in the ratio of professional library staff predicts a 0.72 percent increase in retention.” (Emmons and Wilkinson, 2011, p.144)
- “A higher proportion of the withdrawn students logged into authenticated resources between one and 28 times over the semester, a much higher proportion of the retained students logged in more than 28 times. At the other end of the scale, withdrawn students had zero log-ins at nearly twice the proportion of retained students over the semester” (Haddow, 2013, p.131)
- “The results of two separate logistic regression analyses suggest that logging into databases and using library workstations were actions consistently and positively associated with students' retention” (Soria et al., 2014, p.84)

Better grades or degrees^{1, 11,15, 40, 42}

- “Undergraduates with a GPA above the mean university GPA used the library more than those with a GPA below the mean. There was a correlation between greater use of the library and increases in GPA between the two years—that is, as one grew, so did the other” (Allison, 2015, p.29)
- There is a very strong nonlinear relationship between average usage of resources and average student marks (R-squared = 0.91). Average mark for students who never used UWL electronic resources =58 per annum. Average mark for students that spent up to one hour a year accessing UWL electronic resources per year = 62.” (Cox and Jannti, 2012, [http://er.educause.edu/articles/2012/7/discovering-the-impact-of-library-use-and-student-performance.](http://er.educause.edu/articles/2012/7/discovering-the-impact-of-library-use-and-student-performance))
- “Nonusers are 40 times more likely to fail than high users of library electronic resources” (Cox and Jannti, 2012, <http://er.educause.edu/articles/2012/7/discovering-the-impact-of-library-use-and-student-performance> .)
- “The results of two separate regressions predicting students' GPA by 10 different types of library use suggest that four library use areas were consistently and positively associated with students' GPA: database logins, book loans, electronic journal logins, and library workstation logins. “(Soria et al., 2014, p.84)
- The only variable that made a significant impact on graduation was the number of professional library staff. A 10 % increase in the ratio of professional library staff predicts a 1.55 % increase in graduation.” (Emmons and Wilkinson, 2011, p.145)
- The project has successfully demonstrated that there is a statistically significant relationship between student attainment and two of the indicators: e-resources use and book borrowing. This relationship has been shown to be true across all eight UK partners in the project.” (Stone et al., 2012, p.26)

Improved skills for coursework, assessments or research^{2, 4,5,12-14,17,19,20,24-26,29,30,32-34,37,38,41,45-49}

- “The searching skills of first year pre-registration nursing students improve following information literacy sessions ($p < 0.001$), and remain unchanged 1 month later, regardless of teaching method. The two methods (online v face to face) produce a comparable improvement ($p = 0.263$). There is no improvement or degradation of skills 1 month post-session for either method ($p = 0.216$).” (Brettelle and Raynor, 2013, p.103)
- “16 studies compared traditional instruction with no instruction, and 12 found a positive outcome. Meta-analysis of the data from 4 of these studies agreed with the positive conclusions favouring traditional instruction”. (Koufogiannakis and Wiebe, 2006, p.4)
- “Traditional and web based teaching strongly increases IL skills when assessed pre and post teaching. For controlled studies, traditional teaching increases IL skills but the effect size is smaller than the pre and post studies.” (Weightman et al., 2015)
- “Nine of the ten studies found CAI and face-to-face instruction to be equally effective.” (Zhang et al., 2007, p.480)

Better research, researchers and research achievement^{31,35,44}

- “A significant relationship exists between successful academics, defined as those who publish more and earned an award in the past two years, and the number of article, book and other publication readings.” (Tenopir et al., 2012, p.132)
- “Annually, academic staff spend 197 hours of their work time with library-provided material, or the equivalent of 25 eight-hour days. (Tenopir et al., P.137)

- In the short term libraries contribute to: increased visibility of research, improved institutional understanding of information assets, better research management, improved co-ordination of research activities, good reputation of institution for research. In the longer term the library contributes to increased readership of research, more research income, higher quality research, recruitment and retention of higher quality researchers, more efficient research, more satisfied researchers, higher quality research, greater research output and more motivated researchers (RIN and RLUK, 2011).

A good return on investment for the University²⁶

- Every \$1 spent on the library returns \$4.49 in return for Syracuse University (Kingma and McClure, 2015)

3.4.4 Areas for further research

1. Individual libraries need to determine what their stakeholders believe is important and capture impacts that relate to their own institution which are based on outcomes relevant to their stakeholders.
2. Libraries could develop easier means of collecting data routinely that can be used to correlate with items such as student grades or retention.
3. Mixed methods approaches that have been used in health may be an appropriate way forward, this will show which outcomes the library contributes to alongside evidence that demonstrates how this happens.
4. A UK version of the ROI study (Kingma and McClure, 2015) would provide additional evidence on whether libraries generate similar ROI across sectors as well as providing evidence appropriate for the UK.
5. Collect local data to benchmark and compare with the larger scale UK studies (such as those on the contribution of the library to grades and retention or research quality) (e.g. Stone et al., 2012; Tenopir et al., 2012).
6. The evidence for the use of academic libraries is available, individual libraries therefore need to focus on ensuring their internal practices are effective and efficient – but base these on evidence that is already available and then monitor routinely.
7. No more research is needed on comparing traditional methods of information literacy instruction with online or web based instruction, instead research should focus on exploring the effects of different formats of teaching on behavioural measures (e.g. actual improvements in skills) rather than cognitive measures (tests of knowledge) as these reflect a more accurate understanding of incorporating IL skills in practice (Weightman et al., 2015)
8. Information literacy studies that measure and demonstrate impact over the longer term.

4 Discussion

This report has provided an overview of the evidence for professionally trained library, information and knowledge workers. Despite casting the net wide, evidence is only available in a small number of sectors where LIK professionals work. This includes public, school, academic and health libraries. Evidence on all other sectors is clearly lacking. A number of the studies provided clear evidence of the effect, impact or value of professionally trained library and information staff, in many other cases it was assumed that the work undertaken was being conducted by professionally trained staff,

nevertheless there is a strong trend of the positive impacts of professionally trained library, information and knowledge staff in four key sectors. The evidence regarding professional registration however was lacking, as it was impossible to determine whether staff providing the services on the studies examined were professionally registered as well as trained.

4.1 Evidence for professionally trained and registered LIK workers

The brief was to provide evidence that would support the employment of trained and professionally registered library, information and knowledge workers. A trained professional was viewed as one who had undergone an academic course related to library, information or knowledge such as an undergraduate or postgraduate degree. Professionally registered was viewed as an individual who was registered or accredited by an appropriate professional body. Very little research set out to explore exactly this issue, however it was possible to make some deductions, or in some cases assumptions about this issue so that conclusions can be drawn (or propositions made). For each paper examined it was noted whether there was evidence of professionally trained or registered LIK professional involvement. In some studies e.g. Lance et al., (2010; 2012) when examining the impact of libraries on reading attainment compared schools which had professionally trained and qualified library staff (in the US known as library media specialists) with schools which didn't have such staff, we can say with some confidence that there is evidence that being professionally trained makes a difference. One rapid review (Sutton and Grant, 2011) also examined where it was appropriate to use untrained versus trained library professionals at the reference desk. In cases where a librarian wrote the research paper about their service and the librarian's qualification was provided in the authorship details, this was taken as a proxy for evidence regarding the professional training of the librarian involved. Finally for large scale studies about libraries, e.g. Tessler (2013), it was assumed that there would be some professional librarians running library services such as the BL and this was taken as assumed evidence of the impact of a professionally trained LIK worker. Identifying whether LIK workers were professionally registered was more difficult, and therefore it has been impossible to determine the value, effectiveness or impact of professionally registered LIK workers. One study examined this issue (Henczel, 2014) by using the ISO framework to examine the value of belonging to a professional library body. This was an international qualitative study that presented impacts across themes that mapped to the ISO framework outcomes, however although links are made to the outcomes there was no detail about the impact made as a result of being a member of a professional organisation.

4.2 Methods and methodologies

As noted earlier, this report worked on the premise that the services or interventions provided by librarians are complex and thus it is likely that it is only possible to demonstrate that librarians can make a contribution to most impacts rather than establishing that any impact is directly attributable to them. For example librarians may be involved in reading schemes but they cannot be solely responsible for improving a child's reading ability – as this will also depend on the child, the teachers and parents and it would be impossible to distinguish what else is impacting on the child's attainment. Similarly hospital librarians may provide information that contributes to a reduced length of stay for a patient or group of patients, but this will also be affected by the patient's illness, prior health and the work of all the clinical staff and the hospital environment. For the most part, experimental studies, which would be used in other fields to establish cause and effect and actual impacts, are not appropriate in the library field. The exception to this is measuring the effect of information literacy over the short term, which can perhaps be attributed to short courses. Logic models have been used in a number of reports (Becker et al., 2010; Arts Council England, 2013) to illustrate the complexity,

diffuse nature and wide range of outcomes to which libraries contribute. These are an effective means of graphically demonstrating the impact of libraries, and an example of one for health is provided in Appendix Four.

There are a number of large-scale studies that have successfully provided quantitative data and correlated this with outcomes (e.g. Stone et al., 2012; Kingma and McClure, 2015; Haddow 2013; Tenopir et al., 2012). For this to be meaningful and convincing, this needs to be combined with in-depth qualitative methods that explain HOW the librarians are actually making a difference. To date this has been most successfully done in the health field and there is an increasing number of mixed methods studies which provide quantitative data that is supplemented by qualitative approaches to explain the claims or impacts (e.g. Brettle et al., 2015).

Particular methods appear to have been favoured by specific sectors, however these could be transferred into others. For example there are a number of studies within public libraries which use the Return on Investment Approach (ROI) that has shown consistent results across the public library field (Aabo, 2009), one study has also demonstrated that there is a similar ROI in the academic library sector (Kingma and McClure, 2015) suggesting that it would be worth exploring the use of this method more widely in other library sectors. The critical incident technique approach has been used in both health and also in school libraries (Todd and Kulthau, 2003) and to some extent in one large-scale public library study (Becker et al., 2010). This technique asks users about one particular instance of library service use and tracks how the information was used. If this is combined with asking about contributions about particular outcomes (e.g. Brettle et al., 2015; Becker et al., 2010) this can provide powerful data on the wide ranging impacts that the interaction had, and can be used either qualitatively or quantitatively. Correlational techniques have been used in both academic and school libraries to link library data with institutional data, and good progress has been made in establishing appropriate methods and techniques to do this, particularly in the US. It would be useful to see these techniques adapted and applied in a UK context.

There is a lack of systematic reviews that draw together the work that has been done into a more coherent body of evidence. Much library research is undertaken on a small scale, local level that has little impact. A systematic review can provide a baseline for the field and highlight what needs to be done to improve the evidence base for the future (e.g. Brettle, 2003) as well as highlight a weight or overall trend in the evidence (e.g. Aabo, 2009; Weightman et al., 2015) for specific questions. Furthermore conducting systematic reviews can improve research skills (Brettle and Maden, 2015). An initiative which uses a “hive” approach of mentorship such as that taken by Brettle et al., 2011 and across the Medical Library Association (MLA) systematic review project (<http://repository.unm.edu/handle/1928/27127>) would significantly improve the evidence base across the LIK sector as well as improve the quality of future studies whilst building librarian’s confidence in undertaking research.

4.3 Gaps in the evidence base

One of the purposes of a scoping review is to highlight gaps in the evidence base. The largest gap is the lack of published evidence on the effectiveness, impact and value of the majority of library, information and knowledge sectors. Secondly there is general lack of UK evidence, although there are some notable exceptions. Thirdly in some sectors (notably public libraries) the evidence relates to the impact of the libraries, rather than the librarians. Finally there is a lack of comparative studies, with

only a few comparing the use of professionally trained or registered LIK workers versus those who are untrained or unpaid or where there is no service at all.

Across the board, it is important to determine what outcomes stakeholders believe are important – and then provide the evidence to fill these needs. When conducting the sifting process, it was clear that much of the literature in this field is about discussing how to measure impact rather than providing evidence of the impact based on important outcomes.

There is also no evidence on the benefit of professionally registered library, information and knowledge workers as this hasn't been examined in its own right in terms of impact and it is more difficult to ascertain using the proxy measures we used to assume training. It would be relatively easy for CILIP or one of its special interest groups to conduct a study of their members on the impact of professional registration, combining the ISO framework with the Critical Incident Technique or adapting the methods used by Kloda et al (2014) would provide CILIP with specific examples of how professional registration can make a difference.

4.4 Strengths and limitations of the method

The project was undertaken over a short time frame with limited resources. The systematic scoping method used, provides a means of systematically identifying the available literature, highlighting the approach used and explicitly stating the gaps in searching and identifying the evidence. The purpose of a scoping review is to use a rigorous, non-biased approach to map the available literature; this allows broad questions and areas to be considered.

The search approach was sensitive but due to the broad nature of the question, it is likely that some studies have been missed; indeed literature reviews that were picked up have indicated that this may well have been the case. Within the project time frame and resources, further searching to identify and include these papers was not possible. Ideally citation tracking would have been conducted as well as a more extensive search for grey literature. It was noted that much of the evidence was contained in reports, which were hidden within organisational websites. This is particularly the case for the US literature that is further complicated by the organisation of the professional bodies into sectors and then regions.

Finally, a scoping review does not critically appraise or assess the papers in great detail. Data was extracted regarding the outcomes of interest, but detailed critical appraisal of the studies was not performed. Thus the propositions and recommendations for further research are based on a high level overview of the studies available rather than an in-depth examination of the literature in each area.

5 Conclusion

There is clear evidence of the contribution to the effectiveness, impact and value of trained and professional public, school, health and academic librarians.

Public librarians contribute to a good return on investment, helping people improve their education, health, employment prospects and their sense of belonging to a community and improved attitudes to reading.

School librarians contribute to improved student achievement, positive pupil engagement, improved reading skills and facilitating student learning.

Health librarians contribute to improved clinical decision making, patient centred care, risk management and safety, quality of patient care, health service development or delivery and making efficiency savings.

Academic librarians contribute to improved retention, better grades or degrees, improved skills for coursework, assessments or research, better research, researchers and research achievement and a good return on investment for the university.

There is a lack of UK studies and a lack of studies across many library sectors and a lack of comparative studies. More systematic reviews would provide an understanding of the quality of available evidence, focussed evidence of impact and a baseline for future high quality research.

A range of methods can be transferred between sectors and studies from other countries (mainly the US) can be adapted or replicated for the UK context. Large quantitative studies are important, but these need supplementing with mixed methods or qualitative approaches that explain how the services provided by librarians work and make a difference. At a local level, librarians need to determine what outcomes are important to their stakeholders and provide the evidence that meets these needs.

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Appendix 1: Resources searched

Databases	Websites
Ethos	http://www.cilip.org.uk
LISA	http://www.ala.org
LISTA	https://www.alia.org.au
Web of Knowledge/Science	http://www.sconul.ac.uk
Business Source Premier	https://www.mlanet.org
Medline	http://www.arl.org
Cinahl	http://www.carl-abrc.ca/en.html
Eric	http://www.artscouncil.org.uk/what-we-do/supporting-libraries/
	https://lis-systematic-reviews.wikispaces.com/
	http://ejournals.library.ualberta.ca/index.php/EBLIP

Appendix 2: Search strategies

General keywords for incorporating into searches

- information sciences (non mesh)"/ or information science/ or book collecting/ or classification/ or information management/ or health information management/ or information services/ or library services/ or "information storage and retrieval"/ or exp library science/
- exp Knowledge Management/

(((((ti(value OR effective* OR impact) AND su((research OR research methods)) OR su((evaluation OR surveys)) OR su((focus groups OR qualitative methods)) OR su(scientific method))

LISA - searched via proquest, 25 August 2015 AB

(((((ti(value OR effective* OR impact) AND su((research OR research methods)) OR su((evaluation OR surveys)) OR su((focus groups OR qualitative methods)) OR su(scientific method)) AND stype.exact("Conference Papers & Proceedings" OR "Scholarly Journals" OR "Other Sources")) AND la.exact("English")) AND stype.exact("Conference Papers & Proceedings" OR "Scholarly Journals" OR "Other Sources")) AND la.exact("English")) AND peer(=yes) AND stype.exact("Conference Papers & Proceedings" OR "Scholarly Journals" OR "Other Sources")) AND la.exact("English")
Restricted to 2005-2015

Web of Science

1. (TS=(information scienc* OR book collect* OR classification OR information manage* OR information service* OR library OR librarian* OR libraries OR information storage OR information retrieval OR knowledge management)) AND **LANGUAGE:** (English)
2. (TI=(information scienc* OR book collect* OR classification OR information manage* OR information service* OR library OR librarian* OR libraries OR information storage OR information retrieval OR knowledge management)) AND **LANGUAGE:** (English)
3. #2 OR #1
Indexes=SCI-EXPANDED, SSCI, A&HCI Timespan=2005-2015
4. (TI=(value OR effective* OR impact)) AND **LANGUAGE:** (English)
Indexes=SCI-EXPANDED, SSCI, A&HCI Timespan=2005-2015
5. (TS=(value OR effective* OR impact)) AND **LANGUAGE:** (English)
Indexes=SCI-EXPANDED, SSCI, A&HCI Timespan=2005-2015
- 6.#5 OR #4
- 7.#6 AND #3

- 8.(TI=(research OR research method* OR quantitative OR qualitative OR evaluation))
- 9.(TS=(research OR research method* OR quantitative OR qualitative OR evaluation))
- 10.#9 OR #8
- 11.#10 AND #7
- 12. TOPIC:** (information scienc* OR book collecting OR classification OR information manage* OR information servic* OR library OR librarian* OR libraries OR knowledge management OR information storage OR information retrieval)
- 13. #8 AND #4 AND #1**
- 14.#8 AND #4 AND #1

Refined by: WEB OF SCIENCE CATEGORIES: (INFORMATION SCIENCE LIBRARY SCIENCE OR COMPUTER SCIENCE INFORMATION SYSTEMS OR EDUCATION EDUCATIONAL RESEARCH OR MEDICAL INFORMATICS OR BUSINESS OR EDUCATION SCIENTIFIC DISCIPLINES OR SOCIAL SCIENCES BIOMEDICAL OR SOCIAL SCIENCES INTERDISCIPLINARY)

15. #12 AND #9 AND #4

Refined by: WEB OF SCIENCE CATEGORIES: (MANAGEMENT OR INFORMATION SCIENCE LIBRARY SCIENCE OR COMPUTER SCIENCE INFORMATION SYSTEMS OR HEALTH CARE SCIENCES SERVICES OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS OR COMPUTER SCIENCE THEORY METHODS OR SOCIAL SCIENCES INTERDISCIPLINARY OR COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR PSYCHOLOGY MULTIDISCIPLINARY OR SOCIAL SCIENCES BIOMEDICAL OR SOCIAL WORK OR MEDICAL INFORMATICS OR EDUCATION EDUCATIONAL RESEARCH OR COMPUTER SCIENCE CYBERNETICS)

Business Search Premier

1. (DE "LIBRARY science" OR DE "COMMUNICATION in library science" OR DE "INFORMATION storage & retrieval systems" OR DE "COMMUNICATION in library science" OR DE "INFORMATION storage & retrieval systems" OR DE "DOCUMENTATION" OR DE "INFORMATION resources management" OR DE "INFORMATION retrieval" OR DE "INFORMATION science" OR DE "INFORMATION services" OR DE "INFORMATION technology" OR DE "LIBRARIANS" OR DE "LIBRARIES" OR DE "RECORDS management") AND (DE "KNOWLEDGE management" OR DE "INFORMATION ...
2. TI effective* OR impact OR value
3. AB effective* OR impact OR value
4. ((DE "RESEARCH" OR DE "QUANTITATIVE research" OR DE "QUALITATIVE research") OR (DE "EMPIRICAL research")) OR (DE "INTERVIEWING")
5. S2 OR S3
6. S1 AND S4 AND S5

MEDLINE

1. exp "information sciences (non mesh)"/ or exp information management/ or exp information services/ or exp "information storage and retrieval"/ or exp knowledge/ or exp library science/
2. exp Knowledge Management/
3. 1 or 2
4. limit 3 to systematic reviews
5. "information sciences (non mesh)"/ or information science/ or book collecting/ or classification/ or information management/ or health information management/ or information services/ or library services/ or "information storage and retrieval"/ or exp library science/
6. 2 or 5
7. limit 6 to systematic reviews
8. impact.ti.
9. effectiv*.ti.
10. value.ti.

11. 8 or 9 or 10
12. 5 and 11
13. exp Research Design/
14. exp clinical trials as topic/ or randomized controlled trials as topic/ or feasibility studies/ or intervention studies/ or pilot projects/ or epidemiologic research design/
15. 13 or 14
16. 5 and 11 and 15
17. 12 or 16
18. limit 17 to (english language and yr="2005 - 2015")
19. impact.mp.
20. value.mp.
21. effective*.mp.
22. 19 or 20 or 21
23. 5 and 15 and 22
24. 18 or 23
25. limit 24 to (english language and yr="2005 - 2015")

LISTA

1. TI (effective* or impact or value) OR KW (effective* or impact or value)
2. (DE "RESEARCH -- Methodology" OR DE "INTERNET research" OR DE "PRIMARY research" OR DE "RESEARCH methodology evaluation" OR DE "SECONDARY research") OR (DE "EXPERIMENTAL design" OR DE "REPLICATION (Experimental design)")
3. DE "RESEARCH" OR DE "EXPERIMENTAL design" OR DE "EXPERIMENTS" OR DE "LIBRARY science research" OR DE "LONGITUDINAL method" OR DE "QUALITATIVE research" OR DE "QUANTITATIVE research" OR DE "RETROSPECTIVE studies" OR DE "RESEARCH -- Methodology"
4. (DE "RESEARCH" OR DE "EXPERIMENTAL design" OR DE "EXPERIMENTS" OR DE "LIBRARY science research" OR DE "LONGITUDINAL method" OR DE "QUALITATIVE research" OR DE "QUANTITATIVE research" OR DE "RETROSPECTIVE studies" OR DE "RESEARCH -- Methodology") AND (S2 OR S3)
5. ((DE "RESEARCH" OR DE "EXPERIMENTAL design" OR DE "EXPERIMENTS" OR DE "LIBRARY science research" OR DE "LONGITUDINAL method" OR DE "QUALITATIVE research" OR DE "QUANTITATIVE research" OR DE "RETROSPECTIVE studies" OR DE "RESEARCH -- Methodology") AND (S2 OR S3)) AND (S1 AND S4)

Ethos

abstract:"librar* or information or knowledge management" AND abstract:"value or effective* or impact"

ERIC

1. ((DE "Information Science" OR DE "Information Skills" OR DE "Knowledge Economy" OR DE "Libraries" OR DE "Academic Libraries" OR DE "Electronic Libraries" OR DE "Public Libraries" OR DE "Research Libraries" OR DE "School Libraries" OR DE "Special Libraries" OR DE "Information Services" OR DE "Community Information Services" OR DE "Information Dissemination" OR DE "Information Processing" OR DE "Library Services" OR DE "Reference Services" OR DE "Librarians") OR (DE "Library Science")) OR (DE "K ...
2. TI value or impact or effective*
3. AB value or impact or effective*

4. (AB (value or impact or effective*)) AND (S2 OR S3)
 5. ((AB (value or impact or effective*)) AND (S2 OR S3)) AND (S1 AND S4)
 6. DE "Research" OR DE "Action Research" OR DE "Architectural Research" OR DE "Behavioral Science Research" OR DE "Case Studies" OR DE "Cohort Analysis" OR DE "Communication Research" OR DE "Community Study" OR DE "Cross Cultural Studies" OR DE "Dropout Research" OR DE "Educational Research" OR DE "Environmental Research" OR DE "Exceptional Child Research" OR DE "Feasibility Studies" OR DE "Field Studies" OR DE "Institutional Research" OR DE "Investigations" OR DE "Language Research" OR DE "Library ...
 7. S5 AND S6 **Limiters** - Peer Reviewed; Date Published: 20050101-20151231
- Narrow by Language:** - english
- Search modes** - Boolean/Phrase