Evidence-based Librarianship

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To Marilynn Cavender Smith
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Preface

If I have seen further it is by standing on the shoulders of giants.
Sir Isaac Newton (1642–1727)

Throughout my career as a community college librarian, academic health sciences university librarian, hospital librarian and now librarian at a small military college, I have been intrigued by colleagues who think that they have little or nothing to research, present or publish. Granted, there are librarians with dispositions or situations that may cause them to view library work as a job\(^4\) rather than a career. I contend that our workplaces are laboratories filled with opportunities to explore, research and discover, and I encourage you to use an evidence-based lens to view your work.

The main purpose of this book is to make evidence-based practice more accessible to entry-level, mid-career and experienced librarians alike. In the simplest terms, evidence-based librarianship (EBL) can be defined as the application of scientific principles to the practice of librarianship. This broad definition embodies two schools of thought: using the professional literature to make informed decisions about library operations, and advancing the field of librarianship through research methods (hypothesis development, study design, data collection/analysis, evaluation and publication). Chapter contributors will reference other definitions that will improve your understanding.

Scientific methods can be used to understand, measure, improve and/or justify services, programmes, resources and plans. Beyond improving day-to-day operations, I believe we are obligated to build a knowledge base\(^2,3\) and foster a work culture that results in future generations\(^4\) of native evidence-based practitioners. Evidence-based practice can encourage the growth of a library organisation. Instead of reacting to adverse situations such as budget cuts, reduction in force and so forth, librarians can arm themselves with evidence.\(^5\) Evidence-based practice is sometimes the best defence against top-down decisions that can harm library resources, services and staff.
A quick glance at the table of contents shows an impressive array of contributors, including several luminaries in the evidence-based practice field. Other case-study authors, while relatively unknown in evidence-based practice circles, have much to contribute to our understanding of enquiry-based approaches in different settings. Seven of the eight case studies are supplemented with active learning exercises intended to provoke critical thinking. Based on an interpretation of Bloom's taxonomy by McWhorter and adapted from a recent reference services text, these exercises can be used for classroom assignments, on-the-job training and/or continuing education.

Make evidence-based practice an important focus of your professional career. Establish a community of practice, both figuratively and literally, that uses methodical, logical, rigorous and thoughtful means to make sound decisions that are backed by evidence/data. Pose questions, research the literature, observe user behaviour and activities and continually collect qualitative and quantitative data. Librarian as learner is a force to be reckoned with.

This book would not have been possible without the efforts of dedicated peer reviewers who volunteered their time and expertise to give insightful comments to the chapter contributors, thereby strengthening the value of each case study and resulting in a more cohesive work.

Elizabeth Connor
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References


Introduction: evidence-based librarianship – current trends

Jonathan D. Eldridge

During early 2004 two spaceships landed on Mars on voyages of discovery. These space excursions were the latest in a series of international efforts to learn more about our vast universe.¹ Unlike twentieth-century conceptions of human-driven extraterrestrial travel, space exploration had largely now become the domain of highly sophisticated robots. Within a few months of these Mars landings, robotised rovers on parallel missions began to make startling, unexpected discoveries about this planetary neighbour more than 35 million miles (56 million kilometres) away. Images of a mysterious landscape beamed back to Earth mesmerised billions of people. At the time of submitting this chapter for publication both rovers, Spirit and Opportunity, had far exceeded their life expectancies on Mars as predicted by their designers.²–⁴ Like the space probe Voyager I, now at 9.3 billion miles from the Sun and exploring the far edge of the solar system,⁵ these Mars ventures continue to fascinate and surprise by increasing knowledge. In the process, these explorations prompt revised conceptions of the universe. These robotised space exploration examples also illustrate how a broad, far-reaching vision often dramatically changes during the implementation stage of a specific project.

The international evidence-based librarianship (EBL) movement similarly has surprised both its early visionaries and its sceptics alike. EBL has outlived most mainstream librarians’ beliefs of an expected lifespan for a social movement within a profession. EBL has also undergone surprising developments over the past ten years, so it now bears little resemblance to its initial conception. It just keeps advancing and adapting, like the later-generation explorations of outer space. EBL

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has increased knowledge not only by generating needed evidence to support important decisions, but by taking new and surprising directions. The chapters in this book reflect the exciting developments currently occurring within EBL, and a maturity and sophistication that render as ‘quaint’ or perhaps even ‘naïve’ some of the early visionary writings on EBL.

What is EBL?

Given its international scope and its tendency to change over time, definitions of EBL have varied between time and place. Elements of EBL, no doubt, have existed for as long as there have been librarians. The source of the name and some of the basic elements of EBL can be traced clearly back to evidence-based medicine, a social movement within clinical medicine that began officially with a single 1991 publication. Health sciences librarians heavily involved with the evidence-based medicine movement began to conceptualise parallels between the need for high-quality information in medicine and the need for evidence to support important decisions within their own profession. The first articulation of a definition and purpose of EBL occurred during 1997, and since then a number of different definitions representing different nations such as the UK and Canada have appeared, and even undergone multiple revisions by their authors.

For the purposes of this chapter, the author will use the following 2006 definition:

Evidence-Based Librarianship (EBL) provides a process for integrating the best available scientifically-generated evidence into making important decisions. EBL seeks to combine the use of the best available research evidence with a pragmatic perspective developed from working experiences in librarianship. EBL actively supports increasing the proportion of more rigorous applied research studies so the results can be available for making informed decisions.

The essence of EBL boils down to a structured process for making well-informed decisions. These criteria for selecting the most appropriate types of research-based evidence ensure that these decisions are well informed. Different definitions from various nations reflect the different
national contexts and the special emphases placed on particular aspects of EBL. For the sake of clarity in this chapter the author will use this definition, although readers, particularly those from outside the USA, are encouraged to read the other aforementioned referenced definitions of EBL in their fuller context to appreciate the variations in EBL and to adopt a definition that makes most sense for their environments and contextual needs.

In the USA the term ‘evidence-based librarianship’ enjoys great popularity. On the international scene, however, the new term ‘evidence-based library and information practice’ (EBLIP) has gained currency due to its more inclusive scope of coverage. The author also has begun to use this new term, although admittedly the acronym ‘EBL’ tends to roll off the tongue far easier and much faster than the mildly clunky ‘EBLIP’. In this chapter, all uses of the term EBL should be equated in the reader’s mind with EBLIP.

A diverse international movement

When this author first began to articulate a vision for EBL a decade ago, he had no inkling that EBL would become such a diverse international movement with variations reflecting unique national contexts as well as different types of libraries. Two years later the author discovered via Bruce Madge that Andrew Booth and Anne Brice in the UK had been having similar musings about EBL. Connections via e-mail led the author to have conversations about EBL with Anne Brice revolving around an EBL programme at the joint 2000 CHLA-MLA annual meeting in Vancouver, Canada. Andrew Booth and his colleagues then sponsored the First International EBL Conference in Sheffield, UK. Ellen Crumley from Canada attended that first international conference during 2001 and with Denise Koufogiannakis began organising the Second International EBL Conference held in Edmonton, Canada, in 2003. Gillian Hallam and Helen Partridge from Brisbane, Australia, coordinated the Third International EBL Conference in 2005, which led Joanne Gard Marshall from the University of North Carolina at Chapel Hill to volunteer to initiate the fourth international conference to be held in Durham, NC, USA, in 2007 (www.eblip4.unc.edu/).

International participation in EBL has been widespread, with representation at these conferences or contacts with the author from at least 23 nations, including Argentina, Australia, Brazil, Canada, China,
Costa Rica, Cuba, the Czech Republic, Fiji, France, Iceland, New Zealand, Nigeria, Norway, Palestine, Peru, South Africa, Spain, Sweden, Taiwan, the United Arab Emirates, the UK and the USA.

This list, while impressive, might mask the fact that the more developed countries, particularly the English-language nations, still tend to dominate EBL. This pattern seems particularly tragic since the developing countries that have both limited resources and severe information needs probably have the most to gain in terms of implementing effective practices brought about by EBL. The EBL movement needs to publish its research and deliberations through more open-access venues to ensure that colleagues in developing countries without access to expensive commercial publications can gain from these communications. Fortunately, the new journal Evidence Based Library and Information Practice based in Alberta, Canada, can be accessed openly. The Medical Library Association’s two principal EBL outlets, Journal of the Medical Library Association and Hypothesis: Journal of the MLA Research Section, also have been open-access publications for several years. Publishing in open-access venues will be a necessary but not a sufficient strategy. The EBL movement also needs to provide outreach and training for colleagues throughout the entire world, both developed and developing, to teach EBL principles and skills. In this latter respect it appears noteworthy that a couple of chapter authors in this book seemed unaware of some key EBL publications. Responsibility for this situation resides principally with EBL advocates and educators, including this author. The EBL movement needs to provide open access to its important publications, preferably referenced at multiple websites. The movement also needs to augment its outreach efforts tenfold to raise broad awareness of these EBL resources throughout the profession.

This book offers authorship representation from five nations. Yet perhaps the more pervasive theme of diversity relates to the varied types of libraries and contexts found in these pages. Academic, government, health sciences, public and special library contexts appear in these chapters. Graduate schools of librarianship and information science also prove to be major catalysts for implementing EBL change in two chapters. One of the most striking features of the diverse international EBL movement has been its continuous provision of a supportive international network of colleagues who embrace their many differences while focusing on common goals. This feature probably explains why this movement has been so successful: because it has not insisted on international standards or regulations of EBL.
The EBL process

Every definition of EBL revolves around a prescribed sequential process leading to an important decision. The EBL process consists of formulating a clearly defined, relevant and answerable question; searching for an answer in both the published and unpublished literature, plus any other authoritative resources, for the best available evidence; critically appraising the assembled evidence; assessing the relative value of any expected benefits and costs of any decided-upon action plan (i.e. make a decision); and evaluating the effectiveness of the action plan. While some variations exist in conceptualising the exact steps of the EBL process beyond the third step of critical appraisal, it appears that different authors lend greater emphasis to different individual steps in the first three steps of the EBL process. Some authors have chosen to concentrate on the question formulation step, others focused on the searching step and others have focused on the critical appraisal step. Beyond the critical appraisal third step, very little has been written. Perhaps this pattern reflects the great variations of contexts within which EBL decision-making must subsequently occur and how these decisions must be evaluated?

All chapter authors utilise the EBL process for reaching important decisions. Roxanne Missingham explicitly follows the process in making decisions for academic, government, public and special libraries in Australia. Brooks et al. clearly follow the EBL process to lead to important decisions as well. Timm et al. actually integrate the process so seamlessly into their chapter that at no juncture do they state explicitly ‘we used the EBL process’. Their health care context, however, suggests that years of using both the similar EBM and EBL processes has probably caused them to internalise the process to the extent that it warrants no cause for drawing attention to what to them, by now, must be obvious. Somerville et al. describe a series of three episodes that reflect following a clear EBL process leading to landmark decisions in the recent history of the California Polytechnic State University library. Farmer and Vezzosi offer intriguing separate accounts of harmoniously merging the EBL process with the action research cycle, or as Farmer terms it, a ‘cycle of enquiry’. This kind of education action research, also described by Vezzosi, conceptualises the process as cyclical or iterative with one cycle ending with further questions.

One distinction probably deserves mention here. While the EBL process appears to be highly adaptable to the research or enquiry cycle, the prominence of raising new research questions does not represent a
core characteristic of the EBL process. Most EBL practitioners would acknowledge the likelihood of new questions emerging towards the end of the process, and the iterative replaying of the process within a project as a natural occurrence. Yet practitioners also would note that the main product of the EBL process should be the reaching of a sound evidence-based decision. The author has taught the MLA's EBL continuing education course nearly 20 times in three countries. High-level library administrators and leaders from several nations who have taken this course have stressed repeatedly that EBL appeals to them because it leads to a decision. For them, the possibility of raising new questions seems besides the point of EBL. On this point it is interesting to note that Brooks et al. tried to follow one UK variation of the EBL process that depicts it as resulting in new questions and discovered that the final step of redefining the question was not a viable option. This discovery further suggests validation to the aforementioned point that library leaders and managers consider the step of generating new questions to be unrelated to their practice of EBL. In their classic work on the information-seeking behaviours of professionals, Leckie et al. moreover hint at this distinction:

For many scholars, the raison d'être is the pursuance of knowledge, and much of their working time is devoted either to current research or to planning for future research. Thus the ultimate outcome of their work is production of knowledge. Professionals, on the other hand, primarily produce services. The work of the professional is necessarily more task-oriented, continually requiring the setting and achieving of goals to provide services to clients in the most efficient manner possible.

The pragmatist philosopher and educator John Dewey made a similar observation when distinguishing between the scientist and one involved with practical matters in his 1933 book How We Think. This rejection of a final question-redefinition step by practitioners additionally might underscore the point about the inherent difficulty in prescribing an exact EBL process beyond its first three steps due to different national or organisational cultural contexts. Regardless of workplace context, those producer-oriented EBL librarians with a more sustained interest in conducting applied research probably find the possibility of new questions emerging from an EBL process as an appealing endpoint of the process. This difference in perspective might point to the use of EBL primarily by the vast number of EBL practitioner 'consumers' within the
library profession rather than comparatively small numbers of researcher ‘producers’ of EBL evidence.

The chapters in this book lend different emphasis to different steps in the EBL process. The chapters by Brooks et al., Timm et al. and Farmer devote particular attention to question formulation. Somerville et al. actually describe a series of three instances of pursuing the EBL process with the formulation of three discrete questions. The chapter by Vezzosi focuses upon the search for the evidence, turning to the rich, theoretically grounded field of educational research for hypotheses and context for designing her research to answer her questions. The chapters by Brooks et al. and Farmer also give attention to the searching step in the EBL process. Brooks et al. devote the major portion of their chapter to how they had to design, with outside assistance, a series of studies to search for the evidence by querying their users through structured observations of users navigating the library’s website coupled to user diaries, telephone interviews with faculty members and an online survey. Farmer reviewed the extensive information literacy instruction literature as part of her searching step in the EBL process. Vezzosi searched for the needed evidence through five focus groups, participant observation of five groups and interviews with responses coded for ease of interpretation.

The chapter by Somerville et al. describes another exciting model for generating the needed evidence using on-campus students’ social informatics research projects. In this model, the library’s managers and teaching faculty initiated, and then guided, the EBL process through collaborative question formulation while the students pursued the actual search for the evidence through their academic course projects. The research methods included focus groups, phenomenographic analysis, descriptive surveys, interviews and usability studies. The library managers then critically appraised this locally generated research evidence. The Somerville et al. chapter also features two different types of collaboration: first, graduate school faculty members (Professors Helen Partridge and Anita Mirijamdotter) worked with applied research in a work setting; second, this case study features Australian, Swedish and US authors. Vezzosi devotes a great deal of effort to critically appraising the large volume of evidence from the qualitative methods she employs. In fact, Vezzosi not only uses EBL process step three of critical appraisal in her chapter, but also describes how she teaches it to the students at her university in Italy. Perryman and Marshall taught the third step of critical appraisal to their four graduate library and information science students at the University of
North Carolina in the USA. For this pilot course’s training, they relied heavily upon the critical appraisal tools created by Booth and Brice. This pilot course deserves attention because it is the first time a graduate school has offered a free-standing credit course on EBL. Prior efforts have integrated about eight hours of class time in the medical informatics course at the University of North Texas taught by Professors Ana Cleveland and Gale Hannigan. Otherwise, EBL has been taught only in venues such as the MLA continuing education course on EBL.

While chapter authors in this book conduct a cost-benefit analysis as a fourth step, as broadly conceptualised within the EBL movement as incorporating non-financial ‘costs’ and ‘benefits’ such as user preferences and library values,40 the different contexts for the case studies prompt some diversion from a prescribed course. Missingham’s benchmarking study involving government, academic, special and public libraries in Australia utilises this broad conception by defining a benefit as users’ high level of satisfaction on surveys. Missingham then draws the noteworthy conclusion that implementing the EBL process became an actual benefit in their experiences: ‘EBL has provided the cornerstone of development which benefits users and libraries.’ Farmer employs the Delphi method for gaining stakeholder approval of a plan for teaching information literacy in secondary school as an essential acquired ‘benefit’ and avoided the ‘cost’ in non-financial terms prior to implementation. Missingham also concentrates on the fifth and final evaluation step in the EBL process. Farmer’s chapter describes several evaluation tools that were used to measure progress in her information literacy instruction programme.

The EBL process begins with the first step of formulating a focused, answerable question. How the EBL process then progresses, regardless of degree of emphasis given to any one step, hinges on an analysis of how the particular type of question links to appropriate forms of evidence to serve as answers. The next section outlines how the EBL practitioner makes these linkages.

Diverse questions lead to diverse approaches

As mentioned, EBL originated in health sciences libraries. Initially, librarians conceptualised EBL along the lines of evidence-based medicine
that utilises the concepts of diagnosis, therapy and prognosis. The merits of different forms of evidence in critical appraisal at the outset followed the medical model closely. Beginning in 2002, however, EBL advocates began to recognise that different types of questions occurred in librarianship than in clinical medicine. Moreover, these different types of questions required different types of evidence to answer appropriately. This change also signalled the need to consider using evidence generated by quantitative and qualitative research methods when answering EBL questions.

The chapters in this book reflect the recognition that different questions require different approaches for securing the needed evidence. Formulating questions demands effort and repeated practice, even for librarians acquainted with the similar protocol of conducting a reference interview. Almost always the initial question posed upon analysis leads, at the very least, to significant revision. Sometimes this first step leads to complete reformulation when the librarian recognises that an entirely new question lurks behind the original question. An international collaboration during 2001 led to a lengthy compilation of EBL questions identified by respondents to a brief questionnaire as the ‘most important answerable questions facing the profession’. The next year an analysis of these questions led to the finding that almost every question compiled could be classified into three basic categories: prediction, intervention or exploration. The following definitions for these three categories illustrate the system.

- **Prediction.** These questions seek to discover patterns that might be expected to occur under similar circumstances. Many collection usage studies and library literacy training pre-test and post-test studies address these questions.

- **Intervention.** These questions seek to determine the comparative efficacy of one course of action versus another course of action. For example, is one method of instruction superior to another when compared accurately?

- **Exploration.** These questions often ask either overtly or indirectly ‘why’ something exists or does not exist. For example, why do students use libraries? Or why do some students not use libraries?

Table I.1 illustrates the system graphically; this table assumes that neither any publication bias nor what Rosenthal refers to as the ‘file drawer problem’ has occurred when assembling relevant evidence.

Timm et al. use a prediction type of question to determine if input from literature searches lowers costs and shortens hospital stays for
Patients. They utilise a straightforward case control method involving quantitative measures and analyses to determine that the study group on average spent two fewer days in the hospital at a cost of $7,045 compared to the control group cost of $10,663. Using an EBL process, their study validated a health sciences practice dating back to the 1960s. Missingham generates large volumes of data as part of her retrospective cohort study to answer another prediction question about evaluating existing interlibrary loan services with an eye on improving services in the future. The remaining chapters in this book describe EBL exploration questions that otherwise require qualitative research methods to answer most appropriately.

Levels of evidence

Each category of question requires different types of research methods to produce the evidence needed to answer them appropriately. Within each
column in Table I.1, different types of research methods have more or less validity in a general hierarchy so that research methods vary in their value for answering different questions. This hierarchy makes a great deal of sense to experienced researchers, but it can seem disorienting to librarians who are less familiar with the concept of methodological validity and the scientific (as opposed to the rhetorical) concept of bias. The higher the research method on the hierarchy featured in Table I.1, the better job it performs in minimising bias and ensuring validity. Interested readers should read the article in which Table I.1 first appeared for a more complete explanation of the hierarchy.49

The chapters in this book pose EBL questions that can be categorised by question type: prediction, intervention or exploration. The exception would be the Perryman and Marshall chapter since their case study describes a pilot EBL course that was taught to four graduate students. Table I.2 outlines the questions, whether or not expressed explicitly by the authors, and links them to question type.

Missingham's chapter demonstrates how a set of questions spawned a set of sub-questions in a broad benchmarking initiative involving many diverse types of libraries in Australia. Vezzosi seeks to answer an exploratory question, but ends her chapter with plans to answer a prediction question using a prospective cohort design to pre-test and post-test students to gauge the effectiveness of students' progress. Brooks et al. describe how they commissioned Formative Evaluation Research Associates (FERA) to assist library employees in defining the questions they wanted to answer. The central question became simply an exploration to understand users' needs better. Through three different forms of qualitative research they sought an answer to this important question.

The evolution of EBL

Reviewing the many changes that have occurred in EBL within a single decade makes it tempting to predict its status after another decade of innovation and adaptation. This author thinks that the core principles of EBL will remain mostly the same: an EBL process will still exist, the search for the best available evidence will continue and important decisions will be the endpoint of the process. Yet the chapters in this book suggest that, beyond these EBL basic principles, we can expect some exciting and surprising changes.

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Health sciences librarians’ roles in EBL currently are in a state of flux as they are no longer the sole ‘owners’ of EBL. While they might have established and developed its foundation, during the next decade their roles in EBL will be different, yet highly valued. The chapters in this book demonstrate the active involvement of academic, government, public, school and special librarians in EBL. These pioneers might represent a miniscule percentage of the total memberships in these sectors, but there is every reason to believe they are the tentative early adapters in the ongoing diffusion of EBL to other types of libraries.

Diffusion need not be a disorganised and uneven process. The chapter by Missingham demonstrates a coherent process of diffusion from health...
sciences librarianship and an adherence to EBL principles and skills. Other chapters also reflect a thorough knowledge of these principles and skills. On the other hand, some text in at least one chapter suggests an incomplete knowledge of both EBL processes and principles. The EBL movement can remedy such situations with existing resources. The leadership roles for health sciences librarians could shift to two areas where their expertise can facilitate diffusion in an organised and coherent manner. First, health sciences librarians have a large reservoir of experiences with publishing in open-access venues such as PubMed Central and their own professional publications. Health sciences librarians now need to bring their open-access expertise to publishing EBL-related resources. They furthermore need to continue to practise open-access publishing in outlets such as Evidence Based Library and Information Practice, Journal of the Medical Library Association, BMC Biomedical Digital Libraries and Hypothesis. These publications can then form the basis of ‘EBL toolkits’ for all professionals to access. The MLA Research Section homepage (http://research.mlanet.org/) appears to be evolving in this direction. These publishing efforts will aid diffusion for the benefit of colleagues in all types of libraries and information centres.

Health sciences librarians additionally need to serve the wider library and information science professional community by sharing their expertise in research methods, levels of evidence, critical appraisal and other techniques associated with the EBL process. Many health sciences librarians already belong to associations serving other types of libraries, and can quicken the diffusion of EBL knowledge and skills by offering workshops, presenting posters, making presentations, promoting EBL concepts and publishing in non-health sciences library professional outlets. As one example, this author recently gave a workshop and presented the inaugural speech for the first annual library research symposium at the University of Illinois at Chicago. His presentations, revolving around EBL issues, involved audiences consisting of 80 per cent non-health sciences librarians. The new mentored web-based version of the MLA continuing education course on EBLIP involving sustained training through 42 hours of activity will be available to all types of librarians. Health sciences librarians have already ventured into these areas in the past. The MLA continuing education course has been offered in a face-to-face format since 1998 and critical appraisal workshops have been offered by Andrew Booth and Anne Brice in the UK for several years. Some pioneering health sciences librarians even
presented on EBL to a global-level audience of generalists at the 2005 IFLA annual conference. The wider library and information professional community would appear to need health sciences librarians to augment these efforts to facilitate diffusion of EBL effectively.

EBL has always emphasised harnessing the results of applied research in service of making practical decisions. While those who ‘produce’ the research-derived evidence tend to cluster in academic and research centres, the vast majority of librarians who practise EBL as ‘consumers’ work in different environments. These many practitioners have few incentives to produce research-derived evidence and yet conversely possess many incentives to apply this evidence to making decisions. As more librarians become active EBL practitioners in the consumer mode, they will recognise the need to support the production of relevant, research-derived evidence to support their decisions. This linkage should augment practitioners’ support for government- or foundation-funded applied research. The Somerville et al. chapter provides an exciting window to the alternative possibilities of collaboration among graduate school faculty and students who produce evidence and EBL practitioners who must consume the evidence to make important decisions. The ideal role of graduate schools, beyond educating students in EBL, might be to use such collaborative opportunities so that EBL practitioners receive the needed evidence, while the next generation of potential EBL producers will gain the research skills training needed for their future professional careers.

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Designing a curriculum in evidence-based practice for master’s students in library and information science

Carol Perryman and Joanne Gard Marshall

Introduction

Evidence-based practice (EBP) is being adopted by a variety of professions as a way of identifying and using the best available research evidence for decision-making. Within the past ten years the Medical Library Association (MLA) and the Special Libraries Association (SLA) have published statements strongly encouraging the development of research skills in support of library practice. As such, EBP can be seen as a tool for linking research to practice, improving the quality of library and information services and promoting innovation. In autumn 2005 the School of Information and Library Science (SILS) at the University of North Carolina (UNC) at Chapel Hill offered a full-semester course designed to explore and promote discussion of evidence-based library and information practice (EBLIP). Students had an opportunity to investigate the state of EBP implementation in other fields, and to consider the implications of those experiences for library and information science (LIS). Although it would have been desirable to involve more students, having just four regular participants allowed for more in-depth discussion. Faculty members, staff from the UNC Health Science library and students and faculty from the UNC School of Public Health joined the discussion throughout the semester. The experience gave all those involved, including the class speakers, new ways to think
about the research-to-practice link. This case study will discuss the syllabus, materials, speakers and outcomes of the experimental course, as well as lessons learned and plans for future development.

Setting

During the two-year, 48-credit-hour master’s programme, students at SILS are required to submit a master’s paper. Preparation for this research contribution is achieved through participation in a core research methods class, which helps students to develop a basic knowledge of research methods in the social sciences and presents an opportunity to examine and critically appraise LIS literature. The major assignment for the course is a research proposal that students are encouraged to use as a basis for their master’s paper. Readings for the core course vary, but include a mix of social science texts\textsuperscript{3–5} and LIS exemplars.\textsuperscript{6,7} The elective course in EBLIP was explicitly designed to build on the core research methods course described, and to introduce students to more specific ways of linking research to practice through the application of an evidence-based approach to decision-making.

Aside from providing a strongly supportive environment for research, the SILS programme, campus and region are ideal settings for a course in EBLIP. EBLIP emerged initially among health sciences librarians who observed the impact that EBP was making not only in medicine but in all the health professions. In 2006 SILS was ranked second nationally in health sciences librarianship,\textsuperscript{8} reflecting the presence of a number of faculty members in the school whose interests relate to health sciences library and information practice. In 2006 the school became one of the founding partners in a new interdisciplinary programme in health communication on campus. SILS also offers a certificate in bioinformatics and a dual-degree programme with the UNC School of Public Health. A project funded by a grant from the Institute of Museum and Library Services (IMLS) seeks to recruit medical students from neighbouring Duke University into the SILS master’s programme. The Duke students are part of the medical school’s third-year research/education option. Another IMLS-funded project, the Triangle Research Libraries Network (TRLN) doctoral fellows programme, includes two students in the SILS PhD programme who specialise in health sciences and work with librarians at the UNC and Duke health sciences libraries. SILS has contracted with the Environmental Protection
Agency (EPA) to provide library services in nearby Research Triangle Park, which is also home to a wide variety of health-related corporate and research operations.

Objectives

Although the volume of literature on EBL concepts and research studies using EBLIP methods has been gradually increasing, at the time this course was designed and conducted, available training consisted mainly of single-session workshops. To date, participation had generally been limited to health sciences librarians. The intention of the SILS instructors was to offer a full-semester course of potential interest to all students enrolled in an LIS programme, regardless of whether they pursued academic, public, health sciences or special library work. In accordance with this intention, the class’s learning objectives were to:

- understand the principles of EBP, including its origin, development and application in a variety of professional settings;
- be able to apply the techniques of EBP to the practice of LIS;
- explore the ways in which different fields such as medicine, nursing, allied health sciences, public health, social work, nutrition, business, management, public policy, education and others have implemented EBP;
- use the knowledge of EBP implementations in different settings to examine critically and refine the emerging model of EBLIP;
- understand the broader implications of EBP for lifelong learning by professionals.

Methods

Content from three elements was combined to create the syllabus for this experimental course. A handbook of readings on EBL, an online tutorial developed by Carol Perryman and comparative information on EBP in other fields formed the basis for the class. Chapters from the edited text by Booth and Brice, Evidence-based Practice for Information Professionals, briefly describe the EBL model, question-building, LIS research resources, critical evaluation checklists, application and
evaluation of the evidence, and additionally provide a set of ‘special topic’ reviews discussing the application of EBL in the six domains proposed for LIS. Contributing authors include many who are pioneers in EBL, such as Andrew Booth, Anne Brice, Jonathan Eldredge, Alison Brettle, Ellen Crumley and Denise Koufogiannakis. For the tutorial, each of six modules provided text reinforcing the concepts being covered and links to additional explanatory or illustrative information and to the module’s hands-on assignment. The extensive bibliography was separated into groups of citations for evidence-based medicine; EBLIP; EBLIP exemplars; library association research policies; biographies and bibliographies of class speakers; standards and resources; and class bibliographies. The exemplar section of the bibliography, which provided links to research studies using each of the six levels of evidence, was supplemented by materials from the health sciences literature when LIS articles were not available.

To begin with, class members read about and discussed the development of EBM, including controversies about its adoption and use. Next students were introduced to the PICO (population, intervention, comparison and outcome) and SPICE (setting, population, intervention, comparison and evaluation) methods for question-building; both are acronyms for key components of a focused question. While PICO is borrowed directly from EBM, SPICE is one of several question-building templates specifically suggested for use in LIS. Identifying key components of a research question assists in retrieval of pertinent data. Structured abstracts, used in some research publications to save readers time by presenting methodologies and outcomes, were also explained. These discussions were followed by an explanation of critical evaluation, accompanied by the text of an excellent guide to the literature by Trisha Greenhalgh.11 Assigned readings included tutorial text and links to resources such as the Cochrane Collaboration website,12 and were used to prepare students for class discussions.

Class participants led discussion on current research literature, summarising and critiquing findings, validity and applicability and speculating on ways the research might have been improved. To do so the group used lists of evaluative questions provided in Booth and Brice,13 and experimented with an additional listing of questions designed to evaluate more informal information sources, such as surveys done through listservs. Among the papers discussed were several presented at the Third International Conference on EBL in Brisbane, Australia. One of the instructors (Marshall) was an invited keynote speaker at this conference (which occurred mid-semester), and returned
with additional knowledge of new research that had been presented in the sessions.

Assignments were designed to be cumulative throughout the semester, and participants were asked to reflect upon readings and resources each week as a core component of every class. From exercises in creating ‘well-built’ questions derived from scenarios in the tutorial (first practised as a group in class), students built search grids (organised lists of terms and phrases to enable focused searching), conducted searches on their chosen topics, then evaluated the top articles they found by using checklists provided in the course text. After a section on the levels of evidence suggested for LIS, students scanned study abstracts representative of each level of evidence and then made brief statements about them. Examples of these exercises are featured in Appendix 1.A at the end of this chapter.

During class, members also reported their progress with an annotated bibliography assignment which served as a foundation for the final paper, and discussed problems encountered while performing the hands-on assignments from the tutorial modules. Barriers to completion were not due to deficits in understanding, but to issues such as the lack of rigorous evidence or difficulty in retrieving pertinent literature; these difficulties became material for discussion.

The final course assignment was a paper on EBP in a discipline other than LIS. In addition to describing the development, current model and use of EBP in the discipline, students were asked to consider which elements might benefit LIS. In the final class students formally presented their papers. By doing this work the students made important contributions to an emerging body of knowledge concerning the potential of EBLIP. As proof of this, and with the student’s permission, this case study includes an excerpt (see Appendix 1.B) from one student’s paper, from the section on ‘implications for LIS practice’ following an exploration of the evidence-based model for physical therapy.

Both instructors incorporated their research experiences into class discussion. These included Dr Marshall’s work with the evaluation of clinical librarian involvement in medical education,14 and her well-known Rochester study15 which demonstrated the impact of the hospital library on clinical decision-making. Another key study was Perryman and Lu’s exploration of Cambridge Scientific Abstracts Library and Information Science Abstracts (CSA LISA) as a research resource,16 which contributed to discussions about the state of LIS resources. Presentations by researchers and practitioners from other disciplines added a strong interdisciplinary element to the course. In addition to hearing about evidence-based consumer health from a health sciences librarian, speakers
explained EBP in nursing and social work and systematic reviews of the health care literature. One of the classes was conducted as a shared session with a health informatics class from the School of Public Health. The participants also had the opportunity to join a teleconference supported by the Canadian Library Association entitled ‘Evidence based library and information practice – the Canadian scene’.17

Perhaps the most valuable new knowledge grew from comparison of EBP models and practices in other professions with those in LIS, an inevitable outgrowth of discourse with class speakers. All participants achieved a new perspective by learning about the contexts for practice in the various professions, and how EBP had been adapted to suit them, directly from a practitioner, educator or researcher in the various fields of study. Hearing from a nursing educator about the translational tools created to transfer research findings to work settings in nursing practice, and then discussing with her a very current new study about the failure of that model,18 enabled a discussion about whether librarians in public libraries and other settings were ready to benefit from EBL, and translational tools that might help the process in LIS. Speakers are presented here in order of their appearance.

**Evidence-based social work**

Mark Fraser, MSW, PhD, the John A. Tate Distinguished Professor for Children in Need at the UNC-Chapel Hill School of Social Work, spoke about the model for EBP in social work, which was built in response to findings that field practitioners are not generally ready to implement EBP. Barriers identified include time and resource constraints and difficulties in evaluating and applying research literature during the course of their work. As a way to enable the dissemination of social work, research is generally conducted within an academic setting, then findings are synthesised into field guides that become manuals for practitioners. The field guides are translational ‘toolboxes’ designed to assist the field workers in adapting research results to their local settings, and are the social work equivalent to medicine and nursing clinical practice guidelines.

**Evidence-based consumer health**

Christie C. Silbajoris, MLS, AHIP, joined the class to share her experiences with consumer health services as a health sciences librarian
and project director for NC Health Info, the first MedlinePlus Go Local site to be developed in the USA. In the National Library of Medicine's Go Local initiative, regional health resource information is linked from a local website to MedlinePlus, a portal site for consumer health information. In addition to speaking on the topic of online health information quality for consumers and the need to educate consumers in health literacy, her presentation focused on evidence-based practices in programme evaluation. Silbajoris detailed the work done in the past year to measure use of the site, frankly outlining problems encountered in conducting evaluations of online sites. Dr Marshall shared the presentation with Ms Silbajoris during that lesson, speaking on consumer health informatics, which is concerned with the study of issues related to access and barriers to health information, the need to study consumer information behaviours and the need to develop evaluative criteria for evidence-based consumer health information for members of the public who are increasingly involved as partners in care.

Evidence-based nursing

Alice R. (DeeDee) Boyington, PhD, RN, associate professor in the School of Nursing, gave the class a comprehensive overview of EBP in nursing, including the history of its development, then explained the Conduct and Utilization of Research in Nursing (CURN) project, the Stetler model of research utilisation22–24 for individual practitioners, the Academic Center for Evidence-Based Nursing (ACE) Star model of knowledge transformation25 and the work of DiCenso and colleagues on evidence-based decision-making. Models for EBP in organisations were covered as well, including Rosswurm and Larabee,27 Kitson et al.28 and the Iowa model for research in practice. Dr Boyington’s experience includes graduate coursework in LIS, as well as collaborative research with the LIS faculty, ensuring that her presentation was directly pertinent to the class. One class member had led discussion on a recent study30 exploring nurses’ readiness for research activities, so participants were prepared for discussion of this current issue and reflective discourse on the readiness of librarians in practice settings to use and create research. The class members talked about the possibility of ‘borrowing’ from nursing and other fields to build a model for LIS, and considered contextual issues such as regulatory entities, practitioner certification, staff shortages and the research and decision support benefits of well-developed resources like the CINAHL database.
Systematic reviews

Finally, Gerald Gartlehner, MD, MPH, of the Sheps Center at UNC, spoke with the class about the process of conducting systematic reviews. Gartlehner has conducted and participated in numerous systematic reviews for the Agency for Healthcare Research and Quality (AHRQ) and the Drug Effectiveness Review Project (DERP). His presentation covered the advent and growth of EBP centres. He explained the value of systematic reviews in assessing and summarising known best evidence in order to identify gaps in research and build guidelines for medical practice. Part of the discussion focused on the importance of literature searching in this process, and traced the steps taken to ensure comprehensive searching as well as problems due to publication bias among other factors. His presentation offered intriguing glimpses into the latest LIS-related foundational work in support of health research. Aside from informing participants about the processes involved in systematic reviews, discussion about the need for systematic reviews in LIS involved all present in reflection about culture and the need for more rigorous research studies in all areas of practice.

Results

The experience of teaching EBLIP demonstrated that the syllabus could form the basis for a content-rich, full-semester course at the graduate level. Students expressed interest in EBLIP as a method with the potential to improve practice and offer opportunities for continuing learning, and were also cognisant of the fact that as a ‘beta’ course, the teachers were equally involved in the learning process. An example of this was a discussion that arose during the question-building exercises. One of the students had automatically amended the ‘well-built’ question (a question constructed in such a way as to enable focus on the most pertinent aspects of the research concern) when realising that the library literature and bibliographic databases would not be likely to yield the needed results to the original query. Further exploration of problems with the LIS literature, enhanced by material from Booth and Brice, gave all participants a real-world perspective on the challenges faced in LIS, including the need to use literatures from other disciplines, the lack of a strong research culture, difficulties of access to LIS
literature, scant funding for research activities and lack of time to engage in research.

Conclusions

The opportunity to pilot test the course and tutorial helped the instructors to consider how the course might be amended for future classroom and online education, as well as shorter continuing education courses. The Booth and Brice text was an excellent introductory resource, but when used for teaching it needs to be supplemented with additional readings, assignments and directed discussion. The syllabus was crafted so that early lessons were largely reading- and discussion-oriented, particularly the overview of EBM in the first module of the tutorial. As the class progressed through the semester, emphasis on hands-on practice by searching and evaluating the literature increased, as well as reflections on the application of evidence to a practice setting. Future lesson planning would do well to involve participants more actively from the start in hands-on work, although the instructors felt that understanding the roots of EBLIP in EBM was an important early building-block for later discussions. For the exercises in critical evaluation of research studies, offering students the option to choose from literature representing the different domains of library practice would make the experience more immediately meaningful.

Ultimately, the intention of the EBLIP course has been at least twofold: to engage participants in a discourse about the state of research in LIS, and to leave them with practical decision-making tools to use in their work environments. Discourse is a goal because it is often lacking in practice, and because it is required for a shift towards EBP. Without the ability to put research to work, EBLIP is a pointless academic exercise. It is true that many librarians and paraprofessionals will never conduct their own research. However, building an awareness of existing knowledge, critical evaluation of existing information in all its various forms and being able to apply this knowledge to practice are important skills for every member of the profession.

Another objective for the course was to work towards enhancing the existing model for EBL. The course participants recognised that even more discourse and research need to happen before this is possible. Referring back to discussions in Booth and Brice (and elsewhere) about how the information profession so often benefits from research done in
other fields, the group began to envision models that would incorporate approaches from multiple disciplines. 

Offering the online tutorial as a continuing education opportunity would mean a number of changes departing from the present format, which was designed to work as an adjunct to reading and in-class discussion. The use of new technologies would greatly enhance the ability of such an offering (e.g. podcasting of presentations by professionals in other disciplines), thus capturing the multidisciplinary content that added so greatly to the learning experience. A final assignment for a continuing education course might consist of the comprehensive exploration of a practice-related research question, with follow-up reflection on the process itself. This could be a valuable contribution to LIS, especially if such reflections could be made available to the broader community. In this way, the educational experiences could become part of a collective discourse, a crucial part of bridging the gap between theory and practice that must take place in EBLIP.

Another option worthy of exploration is the integration of evidence-based concepts into general LIS research coursework and throughout the curriculum. Only half of the LIS programmes in the USA require a core research methods course. However, all of them provide courses in many or all of the domains of practice that could benefit from an evidence-based approach. In a profession concerned with helping patrons to develop skills, there should be room for the application of these concepts to LIS questions. One possible example is library management, commonly offered as a core course. Library managers in any setting can use an evidence-based approach to validate their contributions to an organisation, in planning for new technology and other changes as they occur and in assessing career and skill development. An understanding of the concepts of evidence-based decision-making would enhance library managers’ critical evaluation of local data. Questions about the success of collection changes, webpage design, programming, outreach or employee staffing are all directly pertinent to libraries, and all could benefit from both master’s-level and continuing education opportunities in EBP.

In the end, the instructors are optimistic about the contribution that the incorporation of EBLIP into the library curriculum could provide. As a new area of study, EBLIP enables both theoretical and practical consideration of the profession’s future direction, and can only strengthen the ability of students to continue building and applying their knowledge base.
Appendix 1.A: sample exercises

I. Identifying research questions

Six different abstracts were provided, one of each type of study suggested for use in LIS (meta-analysis, systematic review, randomised controlled trial, controlled comparison or case control, descriptive survey and case study). Each sample began with a definition of the study methodology, followed by the study abstract, then several questions, as in this example.

A controlled comparison or case control study is an ‘observational study in which the cases have the issue of interest (e.g. successful literature searching) in common, but the controls do not’.


Abstract: Nurses are the largest group of health professionals. Practicing nurses and distance-learning nursing students need access to primary literature. Without direct access to large nursing collections, they must rely on Loansome Doc or interlibrary loan services from hospitals, local public libraries and colleges. Hospital libraries participate more often in DOCLINE than OCLC. Large nursing collections tend to be in libraries affiliated with undergraduate and graduate nursing programs. Most of these are not affiliated with medical schools and tend to be OCLC rather than DOCLINE participants.

a) What was the research question?
b) How was the study designed (what specific methods make it a systematic review)?

II. Question-building from scenarios

Scenario: You’ve just received the bad news: all departmental budgets are cut across the board by 10 per cent. Short of laying off staff, what are your options for additional cost recovery?

a) First, identify your PICO or SPICE components.
b) What is your ‘well-built’ question?
c) What might be the best kind of study to answer your question?
III. Conducting focused searches in an LIS resource

Select one of the questions you built with the PICO model in the previous exercise. Construct a search grid, then conduct your search in one of the LIS resources to find pertinent research studies.

1. What is your ‘well-built’ question? (Restate the question from the previous hands-on exercise here.)
2. What resource did you select, and why?
3. How helpful was your pre-constructed grid in locating research studies?
4. Please paste in three or four of the most appropriate citations you found.
5. How well do you feel the subject headings or descriptors matched the content?
6. Looking at what you found, do you feel the use of keywords could reliably locate suitable literature?

IV. Critical evaluation of the literature

Choose one of these three (linked) articles to read, then evaluate it using one of the evaluative checklists. The evaluative criteria are meant to be inclusive, so not all the questions will apply to every article. For example, if the article doesn’t include a survey, examining the response rate is not possible. [These articles are all available full-text in the bibliography section.]


1. Which article did you choose?
2. What is your assessment of the article? Please provide a detailed analysis, using the evaluative questions (in Booth and Brice text) as a template.
3. Do you feel that the provided checklist is appropriate for evaluation of your article? Why, or why not?

4. Are there other criteria you think should be considered in appraising the article’s reliability? Please explain.

V. Putting it all together

Now’s the time to assemble all the disparate elements of EBL/IP and consider, at least initially, whether it shows potential for helping you as a practising LIS professional. In the last hands-on exercise you were asked to build your own question, then to decide what type of research study might be most applicable to your question. For this module you will revisit that question, and use the PICO or SPICE version to find appropriate literature, which you’ll then appraise using a checklist provided in module 5.

The settings for this exercise will allow you to make multiple attempts – so even though the software program is set up to ask you ‘do you want to take the assessment at this time?’ you can go in, print out the directions, then after you’re done you can paste in your responses.

Comments about your experiences as you go through this process, including explanations of barriers and frustrations, are an important part of this module.

1. What was your initial question?

2. Please restate the PICO version of the key elements of your question.

3. What is your ‘well-built’ question?

4. What kind of study do you think would be best suited to answer this research question?

5. Please record here the resources you searched, including the terms used.

6. Paste the top three articles you retrieved here.

7. Select one of the top three articles for your critical appraisal, and paste its citation and abstract here.
   a) Using a critical appraisal checklist, evaluate the research study.
   b) What is your conclusion about the validity, reliability and applicability of this research article in answering your question? Please support your answer with examples when possible.
Appendix 1.B: summary of implications of evidence-based physical therapy (EBPT) for LIS

Excerpt from the final paper by Martha Preddy, MLIS, PhD student and EBLIP class participant, with her permission.

The literature suggests that issues that are similar to those that are currently confronting evidence-based information practice have challenged the practice of evidence-based physiotherapy. Nevertheless, today evidence-based practice is well accepted in the field of physical therapy. In this scenario, there are implications arising from the practice of EBPT that are relevant to EBIP.

Koufogiannakis, Slater, and Crumley\[35\] have described evidence-based librarianship as ‘a means to improve the profession of librarianship by asking questions as well as finding, critically appraising, and incorporating research evidence from library science (and other disciplines) into daily practice. It also involves encouraging librarians to conduct high quality qualitative and quantitative research’ (p. 62).

Eldredge\[36\] has depicted the hierarchy of evidence for evidence-based librarianship (EBL) as starting with methodologically strong evidence as found in systematic reviews, and RCTs, followed by cohort studies, descriptive surveys, case studies and qualitative research (e.g. focus groups, ethnographic observations). He contends that qualitative research (e.g. ethnographic and focus groups) has been utilized on a limited basis... for the conduct of research in the field of library and information practice. Eldredge however also explains that while qualitative studies could be useful, they are placed at the bottom of his hierarchy because of their potential for biases.

Given the wide utilization of qualitative research in EBPT, despite the concern expressed about the suitability of qualitative research for EBIP, this method of research should be explored, in order to ascertain the types of questions or subject domains for which it could be deemed relevant for evidence-based information practice.
Library and information practice guidelines constitute another resource that needs to be developed. This will require the integration of evidence from research, as well as the knowledge and experience of experts, practitioners and clients similar to the manner in which clinical guidelines have been developed for [the] field of physiotherapy. The guidelines developed should constitute 'best practices' in a wide range of domains including LIS management, information access and retrieval, reference services, collections management, professional training and continuing education.

With regard to the implementation of EBIP, consideration needs to be given to the development of guidelines that target implementation in various institutional contexts (e.g. public, special, and academic libraries) as well as by different types of librarians (e.g. solo, contract, consulting, part time). These guidelines should also address changing management issues. The development of these types of guidelines should prove to be particularly useful to practitioners. These guidelines should be made available in LIS databases as well as through professional Web sites.

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help them find evidence on which to base their practice’, AJN, 105 (September): 40–51.


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Introduction

This chapter presents a case study of evidence-based librarianship in the field of information literacy. A group of students at the University of Parma (Italy) was offered an information literacy workshop connected with the ecology programme and integrated into the curriculum of the Environmental Sciences School. Action research was adopted as a methodological approach and the project was developed as a cycle of observing, planning, acting and evaluating. This chapter relates the research process that was investigated, impressions of how students seek information and how the workshop affected learning outcomes and student perceptions.

Overview of information literacy, evidence-based librarianship and action research

Information literacy is becoming an important focus of academic libraries. In most universities all over the world, librarians are in charge of organising and delivering information literacy programmes, and research activity on this topic has seen a remarkable increase in recent years. The most widely adopted definition of information
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literacy was issued by the Association of College and Research Libraries in 2000:¹ ‘Information Literacy is a set of abilities requiring individuals to recognize when information is needed, and have the ability to locate, evaluate and use effectively the needed information.’

In the context of higher education, information literacy is frequently related to the development of research competencies and involves critical thinking, self-assessment and reflective attitudes. In fact, the cyclical and recursive nature of the research process encourages students to revise their actions, loop back to previous steps and critically assess their work. Snavely and Cooper² state that information literacy, when linked to the research process, promotes the development of higher-order thinking skills, encourages critical reflection and fosters personal awareness, thereby engaging individuals in self-directed learning.

Recent contributions to the literature have underlined the need for contextualising information literacy activities, taking into account both the different approaches and experiences of students and the disciplinary discourse and epistemology. Heinstrom³ investigates the influence of personality and study approach on information-seeking behaviour, while Holschuh Simmons⁴ states that recognising the disciplinary epistemological conventions which shape knowledge is essential for students to become information-competent; librarians play an important role as mediators for disciplinary practices between students and faculty members. Elmborg⁵ relates information literacy to the concept of critical consciousness and stresses the need to move from a skills-based concept towards a broader comprehension of information literacy as a culturally situated phenomenon: information literacy develops within the context of an understanding of the research concerns in particular disciplines and therefore cannot take place ‘in a vacuum’.⁶ Moreover, the integration of information literacy and subject contents helps students perceive the importance of becoming information-competent, fosters their motivation and facilitates their engagement in active learning.⁷

Evidence-based librarianship (EBL) is a means of developing librarians’ professional knowledge and practice as it moves research into daily routine, merging scientific research with the need to solve practical problems.⁸ EBL also encourages the collection, interpretation and integration of valid, important and applicable user-reported and
research-derived evidence. Among the domains in which the EBL approach can be applied, information literacy represents a particularly favourable framework, both to collect data about teaching practice and to implement follow-up strategies. During their daily work, in fact, librarians have the opportunity to observe students and verify the impact of information literacy initiatives, thus gaining understanding of users’ perspectives on library services.

Educational action research is an evidence-based approach which puts action at the core of the research activity: it proposes an enquiry-based approach to innovation in teaching, in which the researcher plays a dual role as both producer of educational theory and user of that theory. No separation is made between the design and delivery of teaching and the process of researching these activities:

- Action research integrates teaching and teachers’ development, curriculum development and evaluation, research and philosophical reflection into a unified conception of a reflective educational practice.

Educational action research can be represented as a sequence of cycles consisting of observe, plan, act and evaluate (see Figure 2.1). The evidence produced by research and the consequent insight gained from the initial cycle lead to the planning of the second cycle, for which the action plan is modified and the research process is repeated (see Figure 2.2).

Both EBL and educational action research base practice on research findings, and the researcher plays the multiple role of enquirer and practitioner.
Setting

The University of Parma is a medium-sized university, with about 30,000 enrolled students. The Environmental Sciences School is divided into two cycles: the bachelor level, lasting three years, and the post-degree level, which lasts two years. Second-year students in the first cycle are required to attend a compulsory credit-bearing information literacy workshop. The researcher is head of the school library and is in charge of organising and delivering the teaching activity. In this project, the cooperation between the teaching faculty at the Environmental Sciences School and the researcher allowed the insertion of a 15-hour workshop into the second-year learning plan, integrating the information literacy activity within the ecology curriculum. The population for this case study is a group of 25 students attending the second-year course (bachelor level). The workshop took place in October 2005. The learning plan was designed as a full-immersion week, with class activity taking place each morning (from 9am to 1pm) and group activity organised by students during the afternoon in an independent way.
Objectives

In the context of action research, the research objectives are related both to the side of enquiry and to the side of action: the improvement of a practice goes together with the improvement of understanding of the practice itself. The objectives of the work described in this chapter were designed to:

- explore experiences and attitudes of second-year environmental sciences students in relation to the information-seeking and research process;
- identify students’ expectations and learning needs;
- organise an information literacy workshop tailored on this particular group of students and integrated into the ecology curriculum;
- analyse the impact of the information literacy workshop on student learning and the changes occurring in students’ experience of the information-seeking and research process.

Methodology

The action research cycle

In the field of information literacy, action research has been adopted by teaching librarians as a methodological approach that encourages ‘reflection in action’ as well as sharing and communication. Johnson and Webber developed a model information literacy programme based on the findings of an action research project in which contents, activity and assessment methods were defined in cooperation with faculty and in conjunction with subject areas. Edwards and Bruce adopted action research as the most suitable approach for encouraging reflective thinking in students involved in an internet-searching workshop; students had to apply the observe, plan, act, evaluate model in their research process. Rowley et al. emphasise the value of action research to understand student use of digital information and identify their learning needs, while Brown et al. underline the effectiveness of action research in educational situations where development and assessment of change are considered necessary.

Action research was also adopted in some large-scale projects such as JUBILEE (JISC User Behaviour in Information-seeking: Longitudinal
Evaluation of Electronic Information Services) to develop information literacy frameworks and action plans. The action research approach is valued because it ‘can obtain otherwise unavailable information, and is also a valuable dissemination mechanism to diffuse knowledge... It increases practitioner acceptance of the research process, thereby reinforcing research outcomes in institutions.’

This action research project represents the first cycle of a spiral starting with the observation of a group of students. Their experiences with the research process and seeking information were investigated, and their expectations and learning needs were identified. Following these findings, an information literacy activity was planned and delivered. The evaluation stage consisted of assessing student learning and analysing changes in their experience of information-seeking and research processes (see Figure 2.3).

**Figure 2.3** Action research plan

<table>
<thead>
<tr>
<th>Research</th>
<th>Observe</th>
<th>Identification of students’ learning needs</th>
<th>Focus groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>Plan</td>
<td>Definition of contents, activity, assessment modes</td>
<td>Workshop design</td>
</tr>
<tr>
<td>Act</td>
<td>Workshop delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td>Evaluate</td>
<td>Analysis of the impact on students</td>
<td>Structured observation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Analysis of group tasks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Individual interviews</td>
</tr>
</tbody>
</table>

**Observe**

Five focus groups were organised before the learning activity. This technique was chosen because of its suitability, in the first exploratory phase of the research project, for acquiring a broad understanding of the context and defining a teaching plan accordingly. Focus-group technique is effective when various perspectives and explanations need to be gathered in a limited amount of time. This technique is particularly
suited for homogeneous groups of participants sharing the same experiences and problems. In this project, another objective for using focus groups was to introduce the researcher to the students and foster student involvement in the following learning activity. Students were invited to share their ways of approaching information problems, both in their study context and in their daily lives. They were asked questions about their use of the university library and their favourite sources of information. All the sessions were recorded; session tapes were transcribed and the contents of the transcriptions were analysed.

**Preliminary findings**

From the analysis of findings emerged students' lack of awareness about the information research tools available at the University of Parma. Only two students stated they were able to search books and journals through the online library catalogue, and nobody was aware of the existence of online bibliographic databases and electronic journals. These findings appeared consistent with anecdotal evidence reported by librarians at the reference desk and with the researcher's non-systematic observation: most students were completely unaware of the existence of bibliographic resources and therefore did not take advantage of the information tools at their disposal.

The group discussions revealed that the library was considered mainly a place suitable for individual study and borrowing textbooks, while all students named Google as their main source of information, for both study purposes and everyday information problems. When students were asked to explain how they used their favourite search engine, nobody named advanced search features or field limitation:

Student 3: Well, there is not so much to do, you stick in one word and then click on ‘Search’.

The help function was not mentioned by students, who seemed to carry out very simple and primitive searches. However, they seemed confident in the capability of search engines to find the ‘right’ answer to their questions and perceived themselves to be very proficient in locating information online. From the focus-group findings, these students appeared as examples of the so-called ‘Google generation’, which is described in the literature as people susceptible to the ‘post-modern condition’
characterised by consumerism, knowledge fragmentation and a disposition to superficiality. These appear to be the main characteristics of these students, who usually adopt the principle of least effort and often seem adverse to lectures, memorisation or ‘busy work’.

**Plan**

In the light of these findings, it appeared important that these students be able to:

- experience a real research process, perceiving the complexity of the world of scientific information and the need to approach it in a more aware and competent way;
- approach a research task working in a collaborative, blame-safe environment, with the opportunity to learn from each other and to try, experiment and reflect on their work, and also to compare different approaches to information problems;
- perceive information literacy as something meaningful for their life, their study and their future career.

It was therefore decided to connect the workshop with the ecology programme and adopt a process-oriented, reflective approach to the information literacy activity.

**Act**

Students were divided into five groups and assigned five ‘information problems’ that were jointly identified by the ecology teacher and the researcher. Each group had to prepare and present to the class a list of valuable information resources useful to analyse the problem assigned. Students were invited to select books, journal articles and websites and to annotate their list with an explanation of research strategy adopted and some evaluative comments about the reliability of the information retrieved and its suitability for the analysis of their information need.

During the class activities (which took place in the department information technology laboratory and in the library) students were presented with some scientific information sources (catalogues, databases and web search engines and directories) as well as the basic information retrieval techniques, while the group activity was organised autonomously by the students in the afternoon hours. On the final day
of the workshop the five teams presented their work. A peer-assessment activity, coordinated by the researcher, followed the presentation and represented the ‘reflective’ aspect of the research task. Students were invited to analyse strengths and weaknesses in their own work and that of their colleagues, and to identify possible improvements. Appendix 2.A at the end of this chapter provides a more analytical view of the learning activity, including expected learning outcomes, contents and methods.

**Evaluate**

Two evaluation methods were used to assess student learning: a structured observation session and analysis of the group research task. In the structured observation, each student was asked to locate six documents from a reference list, using the university online catalogue and a list of electronic journals. All students were also asked to perform a simple subject search using the Current Contents database and were invited to think aloud during their work. Student performance was scored using a three-point scale. The analysis of the group tasks took the following into account:

- information tools adopted;
- reliability and suitability of documents selected in relation to the information problem;
- information retrieval techniques adopted;
- citation;
- presentation;
- self-assessment.

Each aspect of the lists of resources presented by the teams was scored. Two ‘critical friends’, selected among librarians involved in teaching activities at the University of Parma, cooperated in the evaluation phase as peer observers, in order to increase the validity of the researcher’s assessment.

Changes occurring in student perceptions of the information-seeking and research process were investigated through individual in-depth interviews. Although some authors challenge educational context interviews, stating that students are usually unable to articulate their experience, in educational action research this interview approach is considered the best way to understand how students perceive the learning activity and, together with observation, can play a crucial role.
An unstructured type of interview was adopted, to leave space for unexpected insights and allow students to deepen what they perceived as the most important issues. As stated, all the interviews were tape-recorded and transcribed. Students were asked a number of questions.

- I'd like to know your opinion about this learning activity. How did you experience it?
- What about your learning? How do you consider your improvement?
- How do you approach an information problem now?
- *(If students expressed the concept of ‘change’) Why do you think this change has occurred?*
- What do you think you will remember about this experience?

**Data analysis**

The data collected during the interviews were analysed using the constant comparative method of analysis, which involves three types of coding: open coding, axial coding and selective coding. For this study, the first and second levels of coding were used. The transcripts were examined and reduced in categories; then the categories were coded and clustered. Intersections, patterns and consistencies were identified and the topics that emerged were compared with the findings from the focus groups and the researcher’s fieldnotes. This provided a first, general, overview of the richness and complexity of the data. Then the group tasks, individual performance during the structured observation and transcriptions from the individual interviews were compared, drawing a personal profile for each student.

**Results**

**Learning outcomes**

Most students demonstrated the acquisition of a good level of competence in the use of catalogues and databases (see Figure 2.4). Only two students (8 per cent) obtained the lowest score (poor), while seven students (28 per cent) received ‘average’ and 16 (64 per cent) deserved the highest score (strong).
Most students were able to connect the different search tools, passing from the Current Contents database to the list of electronic journals and the library catalogue without any problem. Student competence was also evident in the analysis of the team tasks; apart from one group, all the teams offered a good performance. Teams 1 and 5 demonstrated the acquisition of an excellent level in the use of information search tools and management of the research process. They also offered valuable presentations and demonstrated a critical attitude towards their performance, identifying possible improvements, and in the light of other students’ work. Teams 2 and 3 did not adopt advanced search features during their research process but managed to retrieve valuable documents, mainly thanks to a browsing strategy, while team 4 did not produce a good list of resources. However, this group appeared aware of their weaknesses, and showed a high level of self-criticism and a disposition to learn from their mistakes. Figure 2.5 summarises the results of each team of students in relation to the performance indicators adopted.

**Changes in student perception**

The individual interviews showed changes in student attitudes towards information resources and changed perceptions of the library as a learning environment:
Student 7: I was convinced that the library had only books to be borrowed: I did not know that we could access electronic journals and databases; I was completely unaware of the existence of so many sources of information... Neither did I know we had so much to learn.

Student perceptions of the library, as expressed during the focus groups, related only to books and, in general, printed documents. The world of the internet was considered something completely different, having nothing to do with the library or with valuable scientific information.

Student 19: I have discovered something completely new. I believed that doing research meant being surrounded by lots of books and browsing here and there...

Approaching information problems

Another important change perceived by students was related to the way they approached an information problem. Most students compared the information tools they used before the workshop with the new competencies recently acquired.

Student 22: Actually, I was used to using the web... you know, only Google. I did not know... we have all this amount of scientific knowledge at our disposal.

During the interviews students did not need to be asked questions about the changes in their experience, as they spontaneously made comparisons
between their information-seeking behaviour before the workshop and their new attitudes. One of the most interesting aspects of student reasoning is the comparison they made between Google and the information resources they had started to use.

Student 1: Beforehand I tried to find ‘something’; I mean, I felt easily content with what I had found through Google...

**Perception of the research process**

Some students underlined the recursive nature of the research process as a kind of endless challenge:

Student 9: The most important thing I learned, I believe, is how to use a source of information as a link to other sources... you always have to come back and do another search, but it is a different search, because now you know something more... and so you can do something better.

Other students emphasised the problem of information overload and related it to the need to define a clear focus for their research task. For example:

Student 1: One thing I have learned is that dealing with information is a matter of discarding: you have to eliminate a lot of stuff that is not useful to identify what is really needed.

**Reflection, empowerment and independence**

The experience of perceiving change in their way of approaching an information problem encouraged students to think reflectively about themselves as problem-solvers and learners:

Student 3: There has been a great change in my way of approaching a research task. Beforehand I was a remissive one. I was not convinced that I would be able to find what I needed, and so I easily gave up... Now I feel I have some new competence; I feel able to master my search.

Most students also stressed their ‘unconscious incompetence’ before participating in the learning activity and argued that their new way of
approaching information problems was founded on a higher level of knowledge and awareness:

Student 19: When I started this workshop, I must admit, I was really puzzled. I truly believed everybody was able to find whatever information [they needed] using the internet.

Student 14: I’m still using Google, but now I know how it works... What I have learned about other search tools helps me to use Google in a different way.

Some students expressed a feeling of empowerment through the development of information skills:

Student 10: Now I feel independent. I don’t have to ask someone else to help me.

Recently acquired competence also led to a new perception of the world of scientific communication, which is an important outcome if one considers students as prospective environmental professionals and researchers:

Student 1: The sources of knowledge appeared to me something very distant; now I feel that I can access them.

Discussion

Providing evidence of students’ learning is one of the most debated issues in educational action research, and some authors even wonder whether it is possible to talk about ‘findings’ since action research reports usually focus more on the process than on the findings.24 In this project both quantitative and qualitative methods were adopted to investigate student attitudes, expectations and learning needs and analyse the impact of the learning activity. During the focus groups most students stated they were unable to use any type of bibliographic search tools and reported being completely unaware of the existence of such instruments. Even though it was not possible to compare their performance before and after the seminar (as the research plan did not include a pre-/post-test assessment), the learning outcomes were considered satisfactory by both the
researcher and the peer observers. However, it must be acknowledged that a structured observation or a pre-test administered before the workshop would have provided data comparable to those gathered in the evaluation phase, thus increasing the validity of results. Also, a follow-up test would be helpful to assess the persistence of knowledge and skills acquired during the workshop.

The changes that occurred in students’ approaches to information-seeking appear related to their experience with a research task and the reflective activity which was part of the task itself. The peer evaluation encouraged students to compare different ways of dealing with a research process, understand the need to illustrate and justify their search strategy, reflect critically and learn from these experiences. An important change was that students started to compare different types of information sources and to perceive the library as a gateway to knowledge. Moreover, they became aware of their need to acquire information literacy skills. This realisation is an important outcome related to reflective learning, as it represents the first step in their development as information-literate persons. The relationship among information literacy, critical thinking and reflective practice highlighted in some publications is confirmed in this experience, even if the small number of participating students does not allow greater generalisations from these results.

The integration of the workshop with the ecology curriculum appeared useful in motivating students. The topics defined for the research tasks were perceived by students as related to their interests and their prospective professional life. This fostered student involvement in the group work and created a meaningful link between information literacy activity and subject learning.

At the same time, the cooperation with the ecology teacher appeared fruitful from the point of view of the researcher, as it represented a means for getting a better understanding of students’ needs and provided a contextual framework for the organisation of the teaching activity. A possible improvement in a following cycle of the research spiral could be achieved by involving faculty in the assessment stage, as it is crucial for the evaluation to involve not only the aspects related to information-seeking but the whole learning experience.

The action research approach was experienced by the researcher as stimulating and enriching, but at the same time very demanding. The most critical aspect is related to the high amount of time needed to develop the whole action research cycle: in addition to the fieldwork and the analysis of findings required by the research side, the action side
involved the planning and delivering of the teaching activity, including preparation of the learning material, assessment of students’ work and feedback. In particular, individual in-depth interviews are very time-consuming and the possibility of replicating this action research cycle each year appears unrealistic. Even if action research seems suitable for librarians who aim to base their teaching activity on educational research, the high level of engagement required must be taken into account, particularly in those situations where information literacy workshops are added on to the daily library work.

**Further research**

A further cycle of this action research spiral is planned for autumn 2006. A group of second-year students at the Environmental Sciences School will be administered a pre-test to investigate their existing knowledge and skills before the workshop and compare these results with their performance at the end of the activity. The individual interviews will be replaced by a reflective essay in which students will be asked to evaluate their performance and progress in the acquisition of information literacy skills.

**Conclusion**

This project represents an effort to link enquiry and practice in the field of information literacy. Action research was chosen as an evidence-based and interventionist approach which puts an educational activity at the core of the research project and seeks to investigate the changes produced by the activity itself. The first stage of the cycle (observation) allowed the researcher to organise an information literacy workshop tailored to the attitudes and experiences of students. The final evaluation provided data on student learning and the changes that occurred as they experienced the research process.

The outcomes defined for the learning activity have been attained by most participating students, who have started to perceive information-seeking and bibliographic research as recursive processes requiring reflective thinking skills. Other positive changes included student awareness of their own personal development, a feeling of empowerment and a sense of independence. The integration between the information literacy workshop and the ecology curriculum has encouraged active student participation, while the group task and peer evaluation offered
the opportunity to reflect on their approaches to information and their own learning.

Exercise A

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define action research.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Explain the difference between an action research cycle and an action research plan.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to the use of action research or focus groups to measure learning outcomes.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other aspects of library work that would benefit from action research.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)

Appendix 2.A: workshop outline

University of Parma: environmental sciences degree course – information literacy workshop

The information literacy workshop has the goal of supporting students in the acquisition of the information competence needed for their study and in their future professional life.

Information literacy is related to the ability to identify an information need, formulate it, choose suitable information sources, access and use information, evaluate it critically, synthesise information and communicate it to other people. Becoming information-competent means acquiring self-directed and lifelong learning skills.

The workshop is part of the environmental sciences official curriculum. Students are required to attend at least 15 hours of lessons and to sit a final examination. This learning activity attributes two credits.

www.ResearcherGate.ir
Learning outcomes

1. To become independent and competent in the information-seeking and research process, being able to:
   - identify an information need;
   - articulate and express it;
   - choose the most suitable information sources and the tools available to access them;
   - use effectively some information tools (OPAC, databases, search engines and directories);
   - synthesise the search results;
   - effectively communicate research findings.

2. To improve critical thinking skills and develop a reflective attitude, becoming able to:
   - analyse and assess in a critical way the outcomes of a research task;
   - recognise and experiment with different ways of working, demonstrating flexibility and open-mindedness;
   - identify strengths and weaknesses of one's own working behaviour;
   - evaluate one's own learning process.

3. To improve students’ ability to work in groups, becoming able to:
   - analyse an information problem in cooperation with other people;
   - plan together search activities;
   - define roles and strategies;
   - manage time;
   - understand and appreciate different approaches to problems;
   - synthesise different opinions;
   - manage conflicts and negotiate solutions.

Contents

- The world of information.
- The research process.
- Sources of scientific information.
Information tools: online library catalogues.
Indexing databases.
The web.

Group activity

Students will group themselves in teams of five/six people. Each team will choose one topic among those proposed by the ecology teacher and will use knowledge and skills acquired during the class activities to carry out a piece of research. At the end of the activity students will present their work, which must consist of:

- **One list (15–25 items) of information sources related to the chosen topic.** This list has to be critically annotated, reporting characteristics of information sources; information about availability and access methods; and critical evaluation.
- **One report on the research process and the teamwork.** In order to prepare this report, students will write a group research journal annotating phases of the work; choices made and related motivation; problems emerging and ways of dealing with them; and a self-evaluation of their own work (strengths, weaknesses, what could be done differently).

Topics for group activity:

- management of protected areas: the case of Cinque Terre (Liguria, Italy);
- conservation of aquatic ecosystems;
- biodiversity and food;
- wetlands in Italy;
- European and Italian legislation on protected areas.

Students will start to work on their task each morning with the support of the teacher; during the afternoon the teams will organise their work in an autonomous way. The teacher will be available in the library for further support.

On the final day of the activity each team will present its work, which is to be assessed by the teacher and the other teams. Each team will have 30 minutes at their disposal and will be allowed to adopt visual aids such as PowerPoint slides, websites, overheads, etc.
Assessment and feedback

The final examination will take place in November. Students will be required to demonstrate their searching skills, and in particular they should be able to:

- locate three books through online library catalogues;
- locate three journal papers, both in electronic and printed version;
- perform a simple subject search using the Current Contents database.

References


21. McNiff, ref. 12 above.


Harnessing the power of information

Lesley Farmer

An informed citizenry is the bulwark of a democracy.
Thomas Jefferson (1743–1826)

Introduction

The mission of library media programmes, according to the American Association of School Librarians (AASL), is ‘to ensure that students and staff are effective users of ideas and information’.¹ More than ever, today’s students need to become information-literate in order to deal critically with the myriad of data flung at them daily. To that end, a cornerstone of school library media programmes is information literacy.

Realising that need, the AASL and the Association for Educational Communications and Technology (AECT) developed a set of information literacy standards for students, published in the 1998 volume Information Power.² A year later the International Society for Technology in Education (ISTE)³ published overlapping technology standards for students. Certainly, standards-based education has become more popular, since it facilitates assessment, including cross-institutional comparisons. Theoretically, it offers a well-grounded basis for instruction.

However, it is one thing to have standards and another to implement them. How does the teacher librarian identify information literacy and library programme needs – and address them effectively? How does the
teacher librarian then get the entire school community to buy in? A research-based cycle of enquiry provides a systematic way to make information literacy a school-wide initiative. The following action research case study provides a model for such implementation.

Setting

Redwood High School, the site of the case study, is a suburban comprehensive high school just north of San Francisco. While generally homogeneous, the student population is becoming more diverse in terms of background and academic-social needs. About 82 per cent of the student body are Caucasian (of whom about 11 per cent are Middle Eastern), about 7 per cent are Asian/Pacific Islander, 4 per cent are Latino and 2 per cent are African-Americans (who comprise a growing percentage of students). English as a second language (ESL) and extensive special education services broaden the school’s scope. The school enjoys a strong academic record and a supportive community, and has implemented site-based management since 1992.

At the point of the research effort in 1998/1999, the library programme offered over 30,000 print resources and over 80 magazine subscriptions for all curricular areas (as well as the eLibrary database). Fifteen student computer workstations were networked to provide access to CD-ROMs, software and the internet. Other workstations accessed the library’s catalogue and supported stand-alone applications and special educational needs. A full-time teacher librarian, full-time library technician and part-time library clerk staffed the facility. Library instruction was content-embedded, and several teaching aids complemented verbal help.

In 1998 the school became a leadership school in the Bay Area School Reform Collaborative (BASRC), a multimillion-dollar educational reform project in the San Francisco Bay area sponsored by the Annenberg Foundation and the William and Flora Hewlett Foundation. The school defined its focus as helping students meet district outcomes, beginning with reading, communication and mathematics. These outcomes dovetailed well with information literacy skills, e.g. ‘read and analyze material in a variety of disciplines’, and ‘use technology as a tool to access information’. Since 30 per cent of high-school seniors did not meet graduation reading scores, there was a real recognition of students at risk and the school community wanted to provide resources and services to meet their needs.
Objective

The teacher librarian had a vested interest in helping to meet that challenge. Regularly, students entered the library without a clear idea of what they were supposed to do. They did not construct efficient searching strategies, or know how to delegate work when starting a collaborative project. Too often they typed a natural-language question into a search engine dialogue box and printed out the first ‘hit’. When they asked the teacher librarian for help, their questions were tentative or reflected low-level critical thinking. As a result, students were frustrated and increasingly submitted plagiarised papers. Although a scope-and-sequence of library skills had been approved five years earlier, it was not ‘owned’ by the faculty or carried out systematically.

The teacher librarian wanted to use a cycle of enquiry to address the problem. This model constituted the primary reform process advocated by the BASRC,6 and followed these problem-solving steps:

- define the desired outcome;
- identify the outcome ‘gaps’;
- describe current practice relative to the outcome;
- determine the possible reasons for the gaps;
- identify and develop interventions targeted to address the gaps;
- implement the intervention;
- assess the results, and modify as needed.

When the teacher librarian expressed interest in starting an information literacy study group, the principal wisely recommended that she find a co-chair so the initiative would model collaboration. The teacher librarian chose one of the science teachers as a collaborator, for several reasons: the teacher librarian did not want information literacy to be limited to the humanities; and she also knew that the science teacher was an open-minded risk-taker. The resultant Research Strategies Study Group (RSSG) included representatives from the various academic departments and student body, who acted as liaisons to facilitate all-faculty decision-making and support.

The RSSG set an ambitious goal to improve student information literacy competence by developing a repertoire of research strategies; critically evaluating information; synthesising and sharing information in creative, meaningful ways; and incorporating technology into the literacy process. The group then identified two major research questions.
What information skills do students need to demonstrate?
What interventions will improve student skills?

Methodology

The cycle of enquiry can be considered to be a manifestation of action research, a kind of systematic examination associated most closely with the Teachers College of Columbia University in the 1940s. The main idea was to give teachers an empirical way to improve practice. Action research provides a reasonable way to improve student achievement as well as educational practice. Particularly when variables are hard to control, action research at least provides a systematic approach and encourages reflective decision-making.

Define the desired outcome

First, the RSSG needed to identify what students needed to know and be able to do. The teacher librarian reviewed the current literature related to information literacy and instruction. The group relied heavily on the draft version of the AASL's information literacy standards, the California School Library Association's From Library Skills to Information Literacy, Colorado Department of Education's work on information literacy standards, Michael Eisenberg and Robert Berkowitz's Big6 efforts, the Kansas Association of School Librarians Research Committee study and the Oregon Educational Media Association’s information literacy standards. Using Wappingers Central School District's extensive list of standards and ERIC resources, the group were able to track down numerous efforts on student information literacy.

The teacher librarian created a binder of research and professional readings on information literacy, to which the group referred both during and after the study. The teacher librarian quickly realised that classroom teachers wanted to focus on the concrete aspects of information literacy rather than think theoretically. In that spirit, the faculty wanted to use the term ‘research skills’ instead of information literacy, a term that was not commonly used in the district. As the RSSG analysed the literature, patterns emerged. They developed a categorised ‘inventory’ of information literacy skills based on the teacher librarian’s
original literacy scope-and-sequence, AASL standards and other standards aligned with district outcomes. The list was then validated using a modified Delphi method by having each representative share the draft list with their constituents, and offer modifications based on their perceptions and practice. The co-chairs revised the list and redistributed successive drafts until consensus about the items and categories was reached. The final research skills inventory list was approved at an all-faculty in-service meeting.

**Identify the outcome ‘gaps’**

The approved list formed the basis for developing a baseline assessment of student information literacy. The assessment examined the issue in terms of a system of inputs and outputs:

- input products: assignment handouts, library research handbook;
- input processes: instruction, reference service;
- output processes: student-conducted research, classroom discussion;
- output products: student work, grades.

The RSSG identified a number of evaluation tools to triangulate results, such as library staff observing classes doing library research and noting the level of expertise exhibited for the different competencies; faculty and students using the research skills inventory to rate present skill attainment by grades; the teacher librarian gathering student focus groups to discuss prior and present research experience; and the RSSG examining student work in alignment with the list.

When the data were analysed, the following gaps were identified:

- ineffective search strategies according to the task at hand;
- uneven ability to evaluate websites and determine the quality of information;
- little comparison of different sources on the same topic;
- underuse of specialised reference books;
- incomplete and inaccurate citation practice;
- inability to create annotated bibliographies;
- limited use of graphic organisers;
- disorganised and plagiarised research papers.
**Describing current practice relative to the outcome**

The next step was to assess current instructional practice for all required courses to ensure that all students would have equitable opportunity to learn and practise information literacy skills. Classes were observed again, this time looking for instances of instruction about information literacy/research skills. Assignment handouts were collected, and phrases related to research skills were highlighted, noting explicit and implicit research skills needed for students to complete the tasks competently. Each teacher examined their required course assignments relative to the skills list, noting which assignments expected students to know the skill, reviewed the skill and/or provided instruction in the skill.

The co-chairs examined the consistency across sections of the same course, articulation within a department and coverage across departments. In a couple of cases departments had highly consistent instructional and assignment practices; others varied widely within the same course or across the curriculum. In one department very similar assignments were given in three different courses, but the three teachers involved did not know about each other’s projects. All department chairs were given the data analysis, with the intent to facilitate discussion to calibrate practices. Interestingly, the teacher librarian was already aware of some of these issues, and had mentioned them occasionally to relevant teachers, but the data-driven analysis provided a more objective, systematic approach to reform efforts.

Focus-group students identified the grade level at which they thought they learned the skill, and sometimes mentioned middle school. In response, feeder-school teacher librarians were also interviewed to determine which research-related instruction and assignments were given. It should be noted that student and teacher perceptions of practices sometimes conflicted. For instance, teachers thought that students did not understand plagiarism, but students reported that they had been ‘beaten over the head’ about plagiarism since middle school. On the other hand, students were confused with citation styles because they were given several kinds of formats from different teachers, and did not know which were the ‘right’ ones.

**Determining possible reasons for the gaps**

Based on the analysis of the data, the research group determined several reasons for gaps in student achievement relative to information literacy.
Reasons included the fact that students entered with different levels of experience and expertise in this area; teachers sometimes made inaccurate assumptions about students’ prior knowledge; inconsistencies in information literacy instruction and practice existed among course section teachers; several contradictory citation styles were required of students; and the teacher librarian did not have consistent support in collaborating with teachers to ensure that information literacy competencies were explicitly addressed. It was also found that the school district had developed a research handbook that could have facilitated and regularised information literacy efforts, but the document was over ten years old and did not address online resources and access. In short, no current systematic approach to information literacy existed.

**Identifying and developing interventions**

At another faculty meeting these gaps were discussed and possible interventions were brainstormed. Based on the various sources of input, the study group identified the following interventions, consisting of both input products and input processes, to meet the school’s information literacy objectives:

- develop a scope-and-sequence set of information literacy student outcomes across the curriculum (input product);
- develop research process and product rubrics (input process and product);
- develop curriculum that covers information literacy/research skills (input process);
- create subject-specific webliographies;
- develop plagiarism-proof assignments that enable students to demonstrate information literacy competencies (input product and processes);
- standardise citation practices (input product);
- update the research handbook (input product).

The research group delegated these tasks to the relevant stakeholders or spearheaded the intervention themselves in study pairs, in consultation with the teacher librarian. In that way, subject teachers maintained ownership of the processes and products.
Scope-and-sequence outcomes

The research skills inventory was finalised into a set of student learning outcomes that informed curriculum and lesson design. Of particular interest was an articulation effort between freshman maths and science units to coordinate the timing of information literacy instruction to accelerate learning.

Research process and product rubrics

Redwood High School already had a culture of using rubrics for assessing student learning. Concurrently with the research skills study, a writing study group was developing a writing rubric. Based on the literature review, the study group understood that student research had to be assessed along two dimensions: the process and the product. Two classroom teachers in the study group, with consultation by the teacher librarian, developed the related rubrics (see Tables 3.1 and 3.2), largely building on the work of Eisenberg and Berkowitz and Grover et al. They tested the validity and reliability of the rubrics in several ways: disseminating them to the RSSG for wording and content validity; pilot-testing with high-school students to ensure that they could understand and use the rubrics; and assessing student work using the research rubrics. Because teaching faculty were so concerned about plagiarism, it was included explicitly in the product rubric. To earn a passing ‘3’ students had to demonstrate that all their work was original. Items and ratings were modified in light of the input received, and aligned with other school rubrics to maximise consistency. The rubrics were then pilot-tested in the developers’ classes with real projects, with success.

Plagiarism-proof assignments

An in-service workshop was designed to address the issue of internet-based plagiarism. Again, two RSSG classroom teachers, in consultation with the teacher librarian, created a one-hour simulation. Teachers had to pretend they were high-school juniors who had 30 minutes to write a research paper. They were given a list of plagiarism-receptive topics that were currently being assigned to students, such as ‘Write about a French artist’ or ‘Should marijuana be legalised?’, and a list of ‘cheat’-themed websites such as www.schoolsucks.com/ and http://cheathouse.com/.
Your grade: M or F
Your birthdate: ___/____/______

**Directions:** Please check the box ✔ of the group of sentences for each indicator (such as ‘Determine information needs’) that most accurately represents your action when doing a research project. You should have 7 ✔ (one per indicator) when done reading the rubric.

<table>
<thead>
<tr>
<th>Target indicators</th>
<th>Emerging</th>
<th>Nearly proficient</th>
<th>Accomplished</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Determine information need</strong></td>
<td>☐ Someone else defines the topic and what information I need.</td>
<td>☐ Someone else defines the topic. I can identify, with help, some of the information I need.</td>
<td>☐ I determine a topic and identify the information I need.</td>
<td>☐ I determine a manageable topic and identify the kinds of information I need to support it.</td>
</tr>
<tr>
<td><strong>Develop search strategy</strong></td>
<td>☐ Someone else selects the resources I need and shows me how to find the information. Someone also develops my plan and timeline. I don’t know what to record.</td>
<td>☐ I select resources but they aren’t always appropriate. I have an incomplete plan and timeline, but don’t always stick to them. I return to the same source to find bibliographic details.</td>
<td>☐ I use a variety of information strategies and resources. I have a complete plan and stay on my timeline. I sometimes record bibliographic information.</td>
<td>☐ I always select appropriate strategies and resources. I have a complete plan and can adjust my timelines when needed. I always record bibliographic information for all my sources.</td>
</tr>
<tr>
<td><strong>Locate and access sources</strong></td>
<td>☐ I don’t understand how to use information resources.</td>
<td>☐ I don’t use a variety of information resources.</td>
<td>☐ I prefer to limit the number of information resources I use.</td>
<td>☐ I am comfortable using various information resources.</td>
</tr>
</tbody>
</table>
### Table 3.1 Research process rubric (Cont’d)

**Directions**: Please check the box ✓ of the group of sentences for each indicator (such as ‘Determine information needs’) that most accurately represents your action when doing a research project. You should have 7 ✓ (one per indicator) when done reading the rubric.

<table>
<thead>
<tr>
<th>Target indicators</th>
<th>Emerging</th>
<th>Nearly proficient</th>
<th>Accomplished</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access and comprehend information</strong></td>
<td>☐ Someone else helps me extract details from sources. I have no way to determine what information to keep and what to discard.</td>
<td>☐ I can extract details and concepts from one type of information source. I sometimes apply appropriate criteria to decide which information to use.</td>
<td>☐ I extract details and concepts from different types of sources. I examine my information and apply criteria to decide what to use.</td>
<td>☐ I extract details and concepts from all types of sources. I effectively apply criteria to decide what information to use.</td>
</tr>
<tr>
<td><strong>Interpret and organise information</strong></td>
<td>☐ I need help to find which sources to use. I don’t know how to use facts. I have trouble processing and organising information. I need to be reminded to credit sources.</td>
<td>☐ I use the minimum sources assigned. I just list the facts. I know some ways to organise information. I can use one or two very well. Sometimes I credit sources appropriately.</td>
<td>☐ I create and improve my product by using a variety of resources from school. I organise information in different ways. I usually credit sources appropriately.</td>
<td>☐ I compare/contrast facts from a variety of sources found both in and out of my community. I use various media for products and audiences. I organise information to best meet my information needs. I always credit sources appropriately.</td>
</tr>
</tbody>
</table>
Table 3.1  Research process rubric (Cont’d)

<table>
<thead>
<tr>
<th>Target indicators</th>
<th>Emerging</th>
<th>Nearly proficient</th>
<th>Accomplished</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicate the information</td>
<td>I’m not sure what actions to take based on my information needs. My product is incomplete. I don’t revise.</td>
<td>I know what to do with the information I find. I complete my product, but need help revising.</td>
<td>I act based on the information I have processed, according to my needs. I complete, practise and revise my product.</td>
<td>I act independently on the relevant information I’ve processed, and explain my actions clearly. I complete, practise and revise my product several times. I ask for feedback.</td>
</tr>
<tr>
<td>Evaluate product and process</td>
<td>I don’t know how I did. I need someone to help me figure out how to improve.</td>
<td>I know how well I did, and have some idea on how to improve.</td>
<td>I know how well I did, and make some revisions.</td>
<td>I evaluate the product and process throughout my work, and revise when needed.</td>
</tr>
</tbody>
</table>

Directions: Please check the box ☑️ of the group of sentences for each indicator (such as ‘Determine information needs’) that most accurately represents your action when doing a research project. You should have 7 ☑️ (one per indicator) when done reading the rubric.
### Table 3.2  Research product rubric

Your grade:  
Your gender: M or F  
Your birthdate:  

**Directions:** Please check the box ✓ of the group of sentences for each indicator that most accurately represents your action when doing a research project. You should have 5 ✓ (one per indicator) when done reading the rubric.

<table>
<thead>
<tr>
<th>Target indicators</th>
<th>Adherence to assignment</th>
<th>Organisation</th>
<th>Proof and justification/commentary</th>
<th>Use of language and strategies</th>
<th>Spelling and grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exceptional</strong></td>
<td>✓ All aspects of assignment covered in depth. Bibliography and citations done according to format without errors. Assignment is free of plagiarism.</td>
<td>✓ Well-organised structure and paragraphs that support insightful, defined thesis.</td>
<td>✓ Substantial and appropriate proof with convincing justification and commentary.</td>
<td>✓ Language is mature and clear; sentence structure is varied and well developed.</td>
<td>✓ Errors are rare</td>
</tr>
<tr>
<td><strong>Accomplished</strong></td>
<td>✓ All aspects of assignment covered. Bibliography and citations done according to format with few or no errors. Assignment is free of plagiarism.</td>
<td>✓ Organised structure and paragraphs that support clearly defined thesis.</td>
<td>✓ Suitable proof with convincing justification and commentary.</td>
<td>✓ Language is effective and clear; sentence structure is varied.</td>
<td>✓ Errors are infrequent.</td>
</tr>
</tbody>
</table>
**Table 3.2** Research product rubric (Cont'd)

**Directions:** Please check the box of the group of sentences for each indicator that most accurately represents your action when doing a research project. You should have 5 (one per indicator) when done reading the rubric.

<table>
<thead>
<tr>
<th>Competent</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Most aspects of assignment covered. Bibliography and citations done according to format with some errors. Assignment is free of plagiarism.</td>
<td>Organisation and paragraphs that support simplistic thesis.</td>
<td>Adequate proof with somewhat convincing justification and commentary.</td>
<td>Language is adequate; sentence structure varies somewhat.</td>
<td>Errors appear occasionally.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emerging</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Some important aspects of assignment are missing. Bibliography and citations contain frequent, distracting errors. Assignment is free of plagiarism.</td>
<td>Unorganised structure and paragraphs with underdeveloped or vague thesis.</td>
<td>Inadequate proof with underdeveloped or vague justification and commentary.</td>
<td>Language is awkward; sentence structure is simplistic.</td>
<td>Errors appear often and distract the reader.</td>
</tr>
</tbody>
</table>
Directions: Please check the box ☑ of the group of sentences for each indicator that most accurately represents your action when doing a research project. You should have 5 ☑ (one per indicator) when done reading the rubric.

<table>
<thead>
<tr>
<th>Rudimentary</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Many important aspects of assignment are missing. Bibliography and citations incomplete. Assignment contains uncited information.</td>
<td>☐ Unorganised structure and paragraphs with no apparent thesis or focus.</td>
<td>☐ Inadequate proof with little clear or related justification or commentary.</td>
<td>☐ Language is unclear or repetitive; sentence structure is simplistic and lacks control.</td>
<td>☐ Errors appear continuously and distract the reader.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unsatisfactory</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Most important aspects of assignment are missing. Bibliography and citations missing or incomplete. Assignment contains plagiarism.</td>
<td>☐ No organisation is present; product lacks thesis.</td>
<td>☐ Clearly lacking proof with little or no justification or commentary.</td>
<td>☐ Language is ineffective or repetitive; sentence structure is confused.</td>
<td>☐ Errors make comprehension difficult.</td>
</tr>
</tbody>
</table>
Standardised bibliographic style-sheets

As classroom teachers became aware of the variety of existing bibliographic citation styles that students were asked to follow, they understood students’ confusion and lack of consistency. All the classroom teachers chose to adopt the MLA (Modern Language Association) style, except for the science teachers, who chose APA style. Based on the initial work of the teacher librarian, two RSSG classroom teachers finalised the two bibliography citation style-sheets by including sample entries and a sample paragraph with parenthetical citations. The resulting citation style-sheets were disseminated to all teachers, given upon request from the library, printed in the students’ planning notebook and posted online on the library’s new website portal.

Webliographies

Although the teacher librarian had created unit-specific bibliographies, she and the RSSG wanted to incorporate more technology resources in order to help students. The teacher librarian had already collected and bookmarked appropriate websites, which were used to make webliographies of credible websites and develop a library web portal. This work was done in collaboration with the lead computer teacher and the instructional technology specialist. The original version of the portal featured pull-down menus and other advanced features that some of the school computers could not support. Therefore, a simpler version was produced in order to ensure that all school computers could access it. The library web portal was also accessible from home so that research could be conducted after school hours.

Research handbook

In 1985 district teacher librarians had developed a research handbook for middle- and high-school students. It was sadly outdated, and had not been used in several years. The teacher librarian developed the first revision of the research handbook, aligning the research steps with the school’s identified research skill steps and current information literacy standards. Two other classroom teachers and two student representatives reviewed the handbook for content, pedagogical approach and
readability. The group came up with the idea of featuring each step as a consumable worksheet so classroom teachers could focus on one step in depth. The research handbook was disseminated to all teachers and the area middle/high-school teacher librarians, and posted on the library website portal.

**Implement the interventions**

The key to successful interventions is their use. Because the school had a well-developed staff development structure, the RSSG worked closely with its coordinator to provide a series of in-service workshops. The study group had also identified the key stakeholders for other interventions, such as department chairs or targeted courses.

**Research process and product rubrics**

An in-service workshop introduced the rubrics, and had the teachers use the instruments to assess sample student research papers and as diagnostic tools to target instruction. Freshman teachers were given instructions on how to use the research process rubric as a way for students to set personalised academic goals and as a starting point for discussion about academic readiness.

**Curriculum development**

Departments reviewed their curricula grade by grade, and identified ‘signature’ learning activities that all teachers of a specific course would be required to include in order to ensure equitable learning. Student handouts were designed to address research skills explicitly. Of particular interest was an initiative by maths and science teachers to coordinate their teaching/learning units to optimise content-based research skills instruction. For instance, an early science assignment included website evaluation, which helped maths teachers who assigned students to locate credible datasets to analyse. Since one of the desired student outcomes was the ability to evaluate websites, the teacher librarian collaborated with the computer teachers who oversaw the technology literacy curriculum – which did not include that particular outcome. Using the American Library Association\(^\text{17}\) and InfoPeople websites\(^\text{18}\) on internet evaluation, the teacher librarian developed a
lesson about website evaluation and taught the required computer course students. The computer teachers were impressed with the results, and adopted the lesson for all their sections.

**Plagiarism-proof assignments**

The plagiarism workshop was a great success. In the computer lab the teachers enthusiastically worked individually and in small groups to produce plagiarised reports. Prizes were given for the fastest results and the most credible work. At that point the faculty generated a number of ways to create plagiarism-proof assignments. Most of them had no idea how easy it was to produce such papers, and they came out of the workshop with realistic ways to address this problem proactively.

**Webliographies**

To optimise use, the teacher librarian developed and delivered two in-service workshops. One session targeted departments, giving each group of teachers a subject webliography to explore. Teachers eagerly asked the teacher librarian to develop unit-specific webliographies so that students would access relevant, appropriate websites. These products were usually posted within 24 hours because the teacher librarian already had a good set of websites to draw upon. Another workshop was designed for parents and held at one of their events so they would know how to use the website – and the internet in general – and help their children use appropriate online resources to complete their homework.

**Research handbook**

English teachers who assigned I-Search papers to sophomore students pilot-tested the research handbook.

**Assessing the results and modifying as needed**

After the interventions were developed and implemented for one semester, the RSSG used the same assessment methods to measure the impact of the interventions. The analysis of the resultant data indicated that:
assignments within the same course were more uniform;
- assignments included clearer and more explicit language about information literacy skills;
- the teacher librarian collaborated with more teachers in the research process, including the assessment of research products;
- the teacher librarian was involved earlier in the research process, including identifying student learning outcomes;
- classes of students asked a greater number of higher-level questions when conducting research;
- greater use was made of the research guides by students and teachers;
- website evaluation was taught explicitly in the freshman computer course, and practised in that grade’s science and social studies assignments;
- resources were cited more often and more accurately;
- more attention was paid to students’ research processes along with their final products;
- more students completed research assignments, and work was more solid;
- students plagiarised less often;
- reading scores improved.

The cycle of enquiry served as a catalyst for other reform measures. More frequent cross-disciplinary discussion of curriculum and student outcomes occurred. Special education specialists were called upon more often to diagnose and suggest targeted interventions for failing students. Their students were mainstreamed more often in learning information literacy skills. The research handbook was adopted by the other high-school teacher librarians in the district. Regular meetings between the high school and feeder schools were established to articulate curriculum and academic expectations. A feeder-school principal hired a teacher librarian in order to give that school’s students a better chance of being prepared for high school.

At the end of the first year of action research, several questions arose.

- How can more thorough and standardised assessment be conducted?
- How can data be disaggregated to a greater degree with more impact?
- How can coordination of research and instruction between departments be optimised?
In terms of processes, several modifications are recommended, the chief being more systematic documentation and communication. First, the entire school community should have access to the scope-and-sequence information literacy/research skills student outcomes in order to provide a transparent curricular programme. Second, identified ‘signature’ information literacy/research skills learning activities should be documented and collected for easier access by the teaching faculty, including the teacher librarian. Even collating the student handouts would allow faculty to see what students are expected to do at different points in their high-school education. Third, systematic assessment of sample ‘signature’ student work should be conducted to provide longitudinal data for studying the impact of specific interventions. Fourth, more explicit training on information literacy could be given, as that concept has become increasingly recognised. Fifth, information literacy and research steps should be explicitly pulled from the state’s content standards, and then linked across curricular lines to reinforce instructional commonalities and optimise transfer of learning.

Conclusion

This enquiry-based cycle made a significant impact on student learning because it focused on student achievement, grew out of teacher-perceived need, involved the entire school community in meaningful ways, informed parents and feeder schools, built on recognised information literacy standards and existing district outcomes, leveraged existing school reform initiatives, provided opportunities for distributed teacher ownership and leadership and used the expertise of the teacher librarian as an instructional partner and information specialist.

By using a cycle of enquiry, Redwood High School faculty were able to reflect professionally and act systemically about student achievement and educational best practices. In terms of library media programmes, the cycle of enquiry provided data-based concrete evidence needed for teachers to ‘buy into’ information literacy. Moreover, the initiative led to practical products that helped students and teachers become more information-literate. This case study also provides a feasible model for other school sites and districts to replicate.
Exercise B

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define information literacy. Define research skills.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>How does the action research process described in Chapter 2 differ from the process used in Chapter 3?</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to the use of learning rubrics.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other aspects of library work that would benefit from identifying outcome gaps.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research. Design a plagiarism-proof assignment for students in a specific academic level (elementary, high school, college, adult learners).</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)

References


2. Ibid.


8. AASL and AECT, ref. 1 above: Chapter 2.


15. Eisenberg and Berkowitz, ref. 11 above.

16. Grover et al., ref. 12 above.


Introduction

In autumn 2003 the director of the Mardigian Library at the University of Michigan-Dearborn (UM-D) announced that the library would be working with a consultant to create an evaluation plan for continuous feedback and improvement of library operations and services. The process described in this chapter shows how the consultant, Formative Evaluation Research Associates (FERA), enabled library staff members to move from simply gathering data towards analysing that data and taking action.

FERA (www.feraonline.com/) provides the non-profit sector with guidance to plan and develop the evaluation process, facilitates the strategic planning process and provides workshops on both processes. With FERA’s help, library staff members identified issues to be evaluated, participated in the development of evaluation tools and analysed the results.

The process included gathering findings, understanding the implications of these findings and making actionable recommendations based on the findings. Stated simply:

- what = findings (data);
- so what = implications;
- now what = recommendations.

The methodology section of this chapter describes the various instruments utilised to gather data, and the results section describes how the library acted on the recommendations revealed by the data in order to increase its effectiveness.
The library did not set out to conduct evidence-based librarianship (EBL), but upon reading definitions and principles of the practice, the process the library utilised does fit the descriptions of EBL in the literature. According to Koufogiannakis and Crumley, EBL is ‘an approach to information science that promotes the collection, interpretation, and integration of valid, important and applicable user-reported, librarian observed, and research derived evidence’. Using three different assessment instruments described in the methodology section, the library collected and interpreted feedback from its users. Koufogiannakis and Crumley go on to say that EBL ‘involves asking questions, finding information to answer them (or conducting one’s own research), and applying that knowledge to our practice’. FERA helped library staff articulate the questions it wanted to ask its users, designed three assessment instruments, gathered the responses and assisted the library in interpreting the results so that library staff members could take action.

Setting

The University of Michigan-Dearborn is located in the heart of Michigan’s industrial and business core, the Detroit metropolitan area in south-east Michigan. The campus is non-residential, with 500 full- and part-time faculty members and a student population of approximately 8,600, of whom 25 per cent are graduate students. Approximately 80 per cent of graduating students remain in the area after graduation. The Mardigian Library is the only library serving the campus community and supports the curricula for four colleges on campus: Engineering and Computer Science, Education, Management and the College of Arts, Sciences and Letters (CASL).

Mardigian Library is an open-stack facility housing a book collection of over 356,000 volumes, an electronic journal collection of approximately 15,000 full-text titles, 125 databases, 563 print subscriptions and more than 8,000 electronic books. All library materials are selected by faculty members and librarians to support the undergraduate and graduate curricula. Mardigian Library is staffed by 28 people, of whom 13 are librarians. The Library Research Center (LRC) has a staff of four full-time and one part-time librarians. In 2004/2005 86 bibliographic instruction classes were conducted, which is the average number of classes taught in the last five years. In the same year the interlibrary loan (ILL) department handled 4,052 requests, a 105 per cent increase since 2000/2001. At the
same time, the library’s circulation statistics decreased by 15 per cent from 67,626 in 2000/2001 to 57,271 in 2004/2005.

The library’s website (http://library.umd.umich.edu/) provides access to the online public-access catalogue and electronic indexes, journals and reference sources. Most of these resources are accessible both on and off campus. The library provides approximately 1,200 study spaces for students, including both group study and silent study areas. Wireless computer access is available throughout the building.

Objectives

When library staff decided to move forward on developing an evaluation programme, library managers wanted to accomplish two things: document the library experience of students and faculty members, and acquire actionable data. To acquire actionable data, the library set two objectives. The principal objective was to develop a process that would enable library managers to obtain reliable data evaluating library effectiveness, to make informed decisions for allocating human and financial resources and to improve quality of service. The secondary objective was to develop data-collection instruments that library managers could replicate independently on a regular cycle.

Library staff elected to work with FERA to develop original evaluation instruments rather than employ an off-the-shelf instrument (e.g. LibQUAL+). Participation by library managers in the instrument design and implementation was critically important in order to develop the in-house expertise needed to weave ongoing evaluation of operations and services into the fabric of the library’s day-to-day management.

Before they started working with FERA, library staff members had been working for many years to improve their understanding of user needs and had developed a fairly good understanding of the challenges and issues related to providing excellent services. Activities undertaken to increase understanding and awareness included:

- working with consultants Peter Carlson (Peter Carlson & Associates, Takoma Park, MD) and Judy Sorum Brown (www.judysorumbrown .com/) in 1998 to apply ‘organisational learning’ concepts;
- conducting a library self-study in 2001 based on the questions found in Standards for College Libraries 2000 Edition to collect data in preparation for an external peer review of the library’s operations and services;
undergoing an external peer review of the library in 2002 (peer reviewers were library consultant Maureen Sullivan of Maureen Sullivan Associates, library director Robert Moran of Indiana University Northwest and library director Robert Houbeck of University of Michigan-Flint);

participating in Richard M. Dougherty’s RADAR4 data-gathering process in 2002 to illuminate student and faculty awareness and perceptions of library resources and services.

Library managers and staff members learned a great deal from these efforts about what students and faculty members know about library services and resources, how they use them and how they perceive the library. While useful in terms of understanding perceptions of both students and faculty, the information obtained from these efforts was incomplete. The managers wanted to know more than user satisfaction or dissatisfaction with existing library services. Instead, they wanted qualitative data that would enable them to know which library services added or did not add value. They were also looking for a process to gain a deeper understanding of student and faculty perceptions and needs than the information yielded by approaches employed in the past.

The partnership with FERA is helping to build the capacity and the practice of regularly and systematically conducting evidence-based research, first with coaching from FERA but ultimately by library managers alone. It is the expectation that regular application of the data-collection processes described below, employed over time, will enable the library to collect and analyse useful data regularly; regularly assess the library’s performance; recognise what is being done well; make informed decisions about what needs to be done differently; and exceed users’ expectations.

Methods

Brice et al. in their 2005 IFLA presentation state: ‘the evidence based practice process can be described as consisting of the following stages:

- Define the problem or question
- Find the best evidence to answer the question
- Appraise the evidence
- Apply results of appraisal
The original research conducted by the library utilised most of these stages. However, since the final phase only concluded in spring 2006, it is too early to evaluate the changes fully and redefine the questions. In the initial planning meeting with FERA, library managers discussed evaluation methods and expressed hopes, concerns and curiosities. FERA shared its approach to programme evaluation:

- design (i.e. clarify information needs, select appropriate research methods);
- implementation (data-gathering, organise data);
- data analysis/interpretation (code data, facilitate interpretation/learning);
- reporting (report findings, gather and incorporate reactions);
- utilisation (deliver reporting product, facilitate strategic/operational planning).

FERA's approach is very similar to the EBL process described above, except for evaluating changes and redefining the problem. At the beginning of the design phase FERA interviewed library staff members and department heads to understand the library and identify areas to assess. Based on these interviews, the library identified three key areas on which to question users:

- library webpage accessibility;
- research education (bibliographic instruction);
- awareness, use and value of the library.

Library managers and FERA determined that each of these areas would be assessed separately, and that the instruments would be shaped by the nature of the information sought. For example, to understand student searching behaviour better, observations and diaries seemed more appropriate than a survey. FERA then began developing questions for each key area. During the design phase library staff members reviewed drafts and recommended changes that FERA implemented. The results of the first two instruments contributed to the design of the third. The instruments included a combination of demographic, open-ended and coded questions. The participants included students and faculty from all levels and schools.
on campus. To facilitate data interpretation, FERA compiled, coded and sorted the responses for analysis. Due to length the instruments are not included in this chapter, but excerpts appear later in this case study.

During the multi-year assessment process, library staff members also read research in the field including two OCLC membership reports, *Environmental Scan: Pattern Recognition* and *Perceptions of Libraries and Information Resources*. The data and conclusions drawn in these reports supported the data collected from users at Mardigian Library.

**Library webpage accessibility**

A few years previously the library had conducted a website usability study, and based on this experience it seemed natural to utilise observations rather than a survey to understand students’ searching behaviour. FERA suggested adding diaries to document how students search when unobserved. During autumn semester 2004 library staff members posted announcements around campus, in the library and on the library website seeking student volunteers for the first evaluation. Finding enough student volunteers to obtain an appropriate sample took longer than expected, even though volunteers were offered a $10 bookstore gift certificate for participating.

The study was conducted with the assistance of two reference librarians and a library science intern who observed and interviewed the student volunteers. Ten students participated: one freshman (sociology); one sophomore (engineering); two juniors (education, international studies); two seniors (management, engineering); and four graduate students (management, management education, masters of liberal studies and engineering).

The observers noted search behaviour and asked interview questions while the student volunteers searched the internet and responded to questions about their searching. The sessions were recorded using screen and audio capture software and lasted between 30 and 60 minutes. The interview questions sought background information about internet use, such as how long they had been using it, their comfort level with computers, the number of hours they spent searching and the place of access. The majority of questions probed into how students find information online, their search patterns, use of specific library services, facilitators and barriers to use and overall satisfaction and recommendations. Interview questions included:

- How often do you find yourself guiding others in how to do online research?
To what extent do you use the library website, search engines, electronic reserves and course materials?

Over the last few years has there been any significant change in how you go about finding online information for a research paper?

Following the interviews, the student volunteers kept search diaries for several weeks. Figure 4.1 shows a sample page from the observation guide.

**Figure 4.1** Library webpage accessibility: sample observation page

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**Research education**

Library staff wanted to assess the effectiveness of research education sessions and explore why more professors did not take advantage of this service. Library managers and FERA agreed that telephone interviews of students and faculty would best provide this information.

During spring semester 2005 library staff contacted students and faculty members who had participated in autumn and winter research education classes. Faculty names were compiled from those who
regularly scheduled classes (participating) and from those who usually did not (non-participating). Eight participating and seven non-participating faculty members were interviewed. Of the 42 students who were contacted, ten agreed to be interviewed. It was a struggle to find enough volunteers for an appropriate sample, even though student participants were offered a $5 gift certificate to the library coffee shop.

Participating and non-participating faculty represented a cross-section by school, academic rank and length of employment. The participating faculty included members from history, biology/environmental studies, microbiology, computer science, political science, writing/humanities and the School of Education. The non-participating faculty included members from natural sciences, special education, psychology, philosophy, accounting/finance, Spanish and industrial engineering.

The participants were contacted by phone and asked a series of questions about research education usefulness, impact on use of library services, impact on other research skills, improving research education, barriers and facilitators and helping students learn to do research, including the following questions:

- Do you feel that you received enough information about the library’s services when you started your academic work at UM-D?
- Are you aware that you can use the library’s website on your own to seek information for research through the catalogue, electronic journals and databases or other resources?
- What motivated you to schedule a research education session for your students?
- How do you gauge the success or failure of a particular research education workshop?

Figure 4.2 shows selected questions from the student telephone interview script.

**Figure 4.2** Research education: selected questions from student interview script

1. Prior to the research education session had you had any formal training in how to do college-level research? __No __Yes. If ‘Yes’, what kind of training?
2. Did you feel that the research education session was appropriate for your level of academic work?

<table>
<thead>
<tr>
<th>Definitely (5)</th>
<th>Probably (4)</th>
<th>Maybe (3)</th>
<th>No, probably not (2)</th>
<th>No, definitely not (1)</th>
</tr>
</thead>
</table>
Figure 4.2  Research education: selected questions from student interview script (Cont’d)

Explain.

Impression of the research education session

We are interested in learning your impressions of the session you attended.

3. In general how satisfied were you with the research education session...?

<table>
<thead>
<tr>
<th></th>
<th>Very satisfied</th>
<th>Satisfied</th>
<th>Dissatisfied</th>
<th>Very dissatisfied</th>
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<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Comment.

4. What particular topic in the research education session, if any, has been most helpful to you?

5. What particular topic in the research education session has been least helpful to you? Why?

6. Was there anything about the way the research education session was conducted that was especially helpful to you?

Impact of the research education session

We are interested in learning what kind of impact, if any, your participation in the research education session had on you and your research activity.

Several methods of conducting research using the library resources were discussed during the research education session. I'd like to talk briefly about some of those methods.

For each of them, I’m going to ask if before you participated in the research education session you already used the particular method. If you had used the method before, I’ll then ask if the research education session helped you use it more effectively. If you had not used the method before, I’ll ask if you have started using it as a result of participating in the research education session.

a) Use of the UM-D library homepage

Had you used the UM-D library homepage before attending the research education session?

___Yes. If ‘Yes’, how much more effectively are you using the homepage as a result of attending the research education session?

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<thead>
<tr>
<th></th>
<th>A lot more effectively (5)</th>
<th>Somewhat more effectively (4)</th>
<th>A little more effectively (3)</th>
<th>Not at all more effectively (2)</th>
<th>Don’t know (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

___No. If ‘No’, have you started using the homepage as a result of participating in the research education session? ___Yes ___No

Comments.

(Probe: successes, confusions/frustrations)
Awareness, use and value of the library

An online survey instrument was created in order to reach as many students as possible. A mailed survey was not conducted because students often do not live at their official home address. An in-library survey was not appropriate because opinions of non-library users were important. Telephone surveys proved to be too labour-intensive and costly for a large sample, suffer from high refusal rates and past experience showed that not enough people would participate. The results of the first two instruments helped to shape the questions asked in the online survey. For example, in the first instrument library staff learned that marketing efforts needed improvement. Questions included in the third instrument focused on changes that needed to be made.

Library staff adhered to university policies regarding testing of human subjects, which changed between the implementation of the second and third instrument. With assistance from the university’s Institutional Advancement department, a random sample of 100 students was invited to test the online instrument during autumn 2005. The return rate for the test was 20 per cent. After the test survey was completed, FERA was satisfied with the results and only a few minor changes were made. Next, the registrar’s office sent an e-mail message inviting currently enrolled students to participate in the online survey.

The online survey instrument contained 37 questions about the library, including awareness and use of library services, methods of informing patrons about new services, satisfaction with existing services and collections and the role and value of the library, including the following:

- If you knew more about how to use the library, either on site or online, would you use it more frequently?
- Are you aware that you can get research help from a reference librarian on the telephone through the ‘Ask-A-Question’ service?
- Can you suggest any other ways the library should try to reach students with information about the library’s services?

Figure 4.3 features a selected page from the online survey.

Respondents were given seven days to complete the survey. Due to a low return rate in the first few days the survey deadline was extended three days; however, no significant surge in responses occurred. Based on the test survey, the library anticipated a 20 per cent return, but the final response was about 14 per cent. The library managers and FERA agreed
that this percentage was sufficient. Students who participated were entered into a draw for a $50 bookstore gift certificate.

**Figure 4.3** Awareness, use and value of the library: selected page from online survey

1. UM-D students can first learn about the general library services in many ways. I’m going to list ways that students might learn basic information about the library. Please tell me if you learned basic library information (such as the location, hours, its on-site and online resources, the library workshops) in any of the ways I mention. Did you learn basic information about the library through...
   ___ one of your classes?
   ___ the library’s publicity (newspaper, fliers, ads, etc.)?
   ___ the library’s orientation?
   ___ information provided during the new student orientation?
   ___ the library’s website?
   ___ a ‘research education’ session provided by a librarian at the library?
   ___ a friend?
   ___ a brochure?
   ___ campus newsletter/newspaper?
   ___ a faculty/staff member?
   ___ phone call to the library to learn more?
   ___ someone who came to my class and spoke about the library?
   ___ campus TV or radio?
   ___ information provided when I attended a campus activity?
   ___ other (specify)?

2. Which of these ways for learning about the library was most helpful to you?

3. Can you suggest any other ways the library should try to reach students with information about the library’s services?

4. Do you feel that you received enough information about the library’s services when you started your academic work at UM-D? _____ Yes _____ No

Comments:

5. If you think back to how you’ve learned to use Mardigian Library for specific academic research, who – or what – has most influenced how effectively you’ve been able to use the library for your academic work?

(Probes: instructors, fellow students, librarians, resources etc.)

6. How frequently do you use the library resources either on the campus or online?
   ___ a. one or more times a week
   ___ b. every couple of weeks
   ___ c. once a month
   ___ d. once a semester
   ___ e. have never used the library

7. If you do not use the library’s resources much or at all, do you obtain research information for your academic work elsewhere? _____ Yes _____ No

If ‘Yes’, where?
FERA’s expertise and assistance in designing and implementing the three instruments were essential to the success of the project. None of the library staff members had the necessary qualifications, previous experience or time to conduct the project in-house.

**Survey results**

FERA delivered the results of each assessment instrument and conducted data interpretation workshops. Library managers and FERA representatives examined the data to determine the major findings (what), implications (so what) and recommendations (now what). FERA divided the data into manageable sections, and the group typically examined four to five datasets per three-hour workshop. During each workshop participants examined the findings and made recommendations individually, and then shared these with the group. FERA staff summarised the findings and recommendations from the data interpretation workshops and library staff members began implementing the recommendations. This phase of the assessment focused on stages three and four of the EBL process: appraising the evidence and applying the results.

**Library webpage accessibility results**

In February 2005 FERA and the library managers held the first data interpretation workshop to examine responses collected during student interviews, observations and search diaries. Figure 4.4 shows selected findings.

The comments were very helpful in understanding the user perspective. When asked what prevented them from seeking help, students replied: ‘I was home alone’, ‘I was not in the library so I was not able to ask the research librarians for help’ and ‘The librarians were busy and I had to leave’. These comments brought to light the importance of communicating how librarians can help students via telephone, e-mail or instant messaging, and of providing online help for students who research when the library is closed and live help is not available.

When students were asked the benefits of using the library’s research databases, they answered that the results were reliable, free, trustworthy, peer-reviewed and scholarly, and that searching was efficient. One student reported: ‘I love researching from home.’ Other comments
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<th>What</th>
<th>So what</th>
<th>Now what</th>
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<tr>
<td>The majority of students used Google to start their search and were satisfied with the results 92 per cent of the time. They found the ‘one search box’ easy to use.</td>
<td>Students like the ease of Google. Searching library databases one at a time is cumbersome. Library databases are not being maximised.</td>
<td>Implement a meta-search product so multiple databases can be searched at the same time. Include Google or Google Scholar in the groups of databases being searched. Market the new product to students. Update: A meta-search product is being implemented and will be available in autumn 2006.</td>
</tr>
<tr>
<td>Six out of every ten students reported wanting help but only three actually sought help; only one person asked a librarian. Comments indicated that some students thought they could get help only when in the building.</td>
<td>Students are not aware of the multiple methods of asking for help. Most students who do seek help are not asking a librarian.</td>
<td>Webpage needs to highlight the multiple methods of asking for help. More marketing is needed to inform students about the choices available to them. Online searching tips or tutorials might be helpful. Update: Webpage is being redesigned in connection with new meta-search product. Online tutorial being planned. Marketing instant messaging option. Investigating virtual reference services in collaboration with other regional academic libraries.</td>
</tr>
<tr>
<td>Five out of every ten students reported learning how to search library resources from a professor or librarian.</td>
<td>Connecting to the students through the faculty is crucial.</td>
<td>Focus on building relationships with faculty and marketing to them more effectively. Encourage more research education classes. Update: A committee was established to focus on faculty outreach, such as hosting faculty events, improving communication with faculty and training library staff on how to build relationships with faculty.</td>
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</tbody>
</table>
highlight the disadvantages of using article databases, such as 'sometimes you can't get full text' and 'if you don't know how to search, you won't find what you are looking for'.

Overall recommendations from this data interpretation workshop included providing meta-search engine software to simplify searching of library resources; developing the library's ability to work with faculty members; improving marketing of library services and resources; continuing to develop the library website to include instructional information, such as online searching tips and/or tutorials; and broadening research education teaching techniques.

These recommendations were delegated to departments and committees to implement. Much progress has been made, but some of the recommendations involve an ongoing focus as opposed to a finite end product. Several new committees were formed, including one to investigate meta-search engines and one to discuss outreach to faculty.

The Meta Search Task Force, an ad hoc committee, researched available software and brought in several vendors to demonstrate their products. A product was selected and installed; usability testing started in July 2006. Another ad hoc committee, the Faculty Outreach Group, examined ways to cultivate relationships with faculty members. This committee consisted of interested librarians who developed a list of library talking points as well as guidelines for interacting with faculty at university events. Several librarians have remarked that the talking points make it easier for them to inform faculty members about library services and resources. The Working Group on Research Education (WGORE) has met since autumn semester 2004 to examine the mission of research education, try different teaching methods and share experiences. The Campus Relations Committee has examined various ways to market library services and resources. This committee created an annual marketing calendar, revised faculty orientation handouts, purchased giveaways including library mugs and pens, created templates for PowerPoint presentations and handouts and created publications and communications guides.

Research education results

In May 2005 FERA and library managers held the second data interpretation workshop to examine data collected during student and faculty telephone interviews specifically about research education classes. Figure 4.5 features selected findings.

Once again, student and faculty comments about research education were very informative. One student reported: 'I was able to get more
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<th>Now what</th>
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| ■ Sixty-seven per cent of students had not used the library website for research before attending an instructional session.  
■ Eighty-nine per cent were satisfied or very satisfied with the session. Students said they found information faster and easier afterwards. | Students are more likely to use library resources after an instructional session. Students who are pleased with instruction can help ‘advertise’ it to other students. | Need to market instructional sessions to faculty, especially those teaching research classes. Create online tutorials and ‘how-to’ tips so students can help themselves. Add student quotes from the survey to marketing materials for faculty. Update: Student quotes were added to research education brochure. Online tutorial software is being evaluated to facilitate the creation of online help. |

Faculty satisfaction with instructional sessions was mixed:  
■ 100 per cent were happy with the content but only 25 per cent rated the librarians’ teaching ability as ‘exceptional’  
■ only 50 per cent thought the handouts were especially helpful  
■ 40 per cent reported the sessions as boring and needed to be more interactive, especially with ‘hands-on activities’. | There is room for improvement in instructional sessions, especially from the faculty point of view. Students do not learn as much if they are bored either by the lack of interactivity or the content being too elementary. | Encourage faculty involvement with session. Gear each session to the level of the students. Consider team teaching so groups could be set up by skill level. Improve teaching techniques, i.e. more activities. Create more ‘take-aways’ for students. Seek funding to upgrade library lab with more computers; use other labs around campus for classroom instruction. Share teaching techniques with each other. Update: A funding proposal was written to upgrade the library lab. Librarians shared teaching techniques. Handouts were posted to the website. Instructional sessions are being held in other electronic classrooms as needed. |
information faster after the session.’ Another said: ‘I’m using journals online more as opposed to going from website to website.’ Yet another reported: ‘My new confidence prevented me from dropping out of a sociology course early in the semester.’ Several students said that the research education sessions contained information they already knew, but not in as much detail. One student said the session was ‘boring and bland. They could spice it up a little.’

When faculty members were asked about their experiences with research education sessions, one said: ‘The library needs a teaching lab with computers.’ Another reported: ‘The most effective part is the hands-on part when they actually go on the computer and find the information.’ Another faculty member said: ‘The students cannot absorb long, boring sessions.’ One faculty member recommended that the librarians ‘force people to pay attention by challenging them, asking them questions, and getting them involved and participating’.

The overall recommendations from this data interpretation workshop included gearing each research education session to the level of the students, adapting to the needs of the class and customising classes on the spot; team teaching and dividing classes into beginning and advanced groups; assessing library collections to make sure they meet the needs of students and faculty; simplifying access on the webpage, reducing the
number of clicks needed to get to information; adding student quotes from surveys to marketing materials; seeking funding for a library instruction lab with more computers; sharing teaching techniques with each other; creating standardised handouts as ‘take-aways’ from all classes; building education and research into the website, such as tutorials and searching tips; hosting an all-faculty open house and building personal relationships with faculty members; marketing library services and resources to faculty; and enriching quality of book information in the catalogue by subscribing to a service that provides book jacket images, reviews, tables of contents, etc.

Most of these recommendations were delegated to the Library Research Center (LRC) to implement. A proposal has been created seeking external funding for a new library instruction lab. Student quotes have been added to the research education brochure. The LRC tested instant messaging (IM) for chat reference during summer 2005 and fully implemented it during autumn 2005. The WGORE continues to discuss a variety of teaching methods. The Campus Relations Committee continues to improve library marketing, and discussions are under way to host a faculty open house with help from the LRC and Events Committee. The library managers decided to purchase enhanced book content for the library online catalogue.

The new Events Committee was created to brainstorm and implement new library events as a way to bring existing and new users to the library. The committee hosted the first annual faculty salon, a student scavenger hunt and a workshop on budgeting for retirement co-sponsored with the university credit union. They also initiated an ongoing faculty and staff book club called R.E.A.D. (read, eat and discuss) held four times a year during the lunch hour.

Awareness, use and value of the library results

In February 2006 FERA and library managers held the third data interpretation workshop to examine data collected during the student online and faculty telephone surveys. Figure 4.6 features selected findings.

There were an overwhelming number of comments from the online survey. FERA helped library managers examine these by sorting them into broad categories. When asked what other services the library could offer that would motivate students to visit the library more often, the replies included offer additional resources (bestsellers, textbooks, more journals, book delivery); increase hours; add more computers and outlets
for laptops; provide more information about library (floor-plan map, e-mail updates, advertise services); offer more food variety in the privately owned coffee shop located in the library; create study rooms;

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<th>Now what</th>
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| The most popular use of the library is for studying:  
- 67 per cent of responding students visit the library once a month or more  
- 36 per cent use the library once a week or more. | It is important that the physical space be inviting, comfortable and designed for how students prefer to work and study. Comments indicated a need for more group study space. | Consider reallocation of areas no longer highly used. Provide more seating options and more group study areas. Update: Budget proposal has been written seeking funding from a donor to add group study space. Library committee has been established to look at the physical environment. One area has been redesigned for autumn 2006 with new beanbag chairs, small group tables, etc., to be more inviting. |
| The second most popular use for library is the website:  
- 68 per cent use it once a month or more  
- 20 per cent use it once a week or more. | The website is the library’s most visible and important service. It needs to be easy to use and informative. | Redesign the website to simplify it and add more content. Update: RSS feeds were added, the new meta-search engine is being implemented for autumn 2006 and the website will be redesigned. Handouts have been added to web; online tutorial is being designed. |
| Seventy-four per cent of students prefer to learn about library services via e-mail. | Concentrate marketing efforts and resources around e-mail. | Utilise campus resources to identify target populations. Send message near beginning of each term about services/resources and what is new. Update: Worked with admissions/registrar to create target groups. Sent incoming freshmen a message about summer privileges. Campus Relations Committee established timeline for sending e-mails to students. |
purchase comfortable furniture and provide more aesthetic surroundings; hire more staff; and improve the parking.

While 76 per cent said nothing was holding them back from taking full advantage of the library’s resources, the 24 per cent who said they were held back reported that there was not enough information about how to use the library’s services and resources; the entrance of the building is too far from the parking lot; library hours were not long enough; and they needed more or different resources (full-text content, better book selection, more power outlets, more computers). Some of these recommendations are beyond the library’s control, such as the location of the entrance and distance from the parking lot, but library staff members can take action on many of these suggestions. The overall recommendations from this data interpretation workshop included:

- creating targeted e-mail messages to be sent early in the autumn and winter to inform students and faculty members of new and existing services and resources, and maintaining an online archive of these messages;
- creating an RSS feed or subscription service for a library tip of the week/month;
- examining ways to communicate library information more effectively during orientation (video, floor-plan map);
- contacting the bookstore manager about distributing library brochures with book purchases;
- continuing efforts to improve comfort and ambience;
- continuing efforts to improve website usability;
- creating online searching tips and/or tutorials for students to use when library is closed, such as tips for using the new meta-search engine;
- investigating the possibility of circulating laptop computers.

Members of the Campus Relations Committee developed a floor-plan map and implemented a current library news blog with RSS feed. Plans are already under way to draft targeted e-mail messages, create an orientation video and investigate the possibility of circulating laptops.

The Library As Place Committee was created to make recommendations and prepare budget proposals for improving the building’s appearance, comfort and ambience. The committee has examined ways to create comfortable seating areas, improve appearance through the use of colour
and create display areas. One obstacle remaining is the lack of power outlets for laptop usage.

The library managers presented the findings and recommendations to the entire library staff and solicited their input for additional action steps. Library staff created an internal website to organise all the documents from the project for easy access. FERA provided the library with an executive summary to use in presentations to the university administration, customers and potential donors.

## Conclusion

UM-D library staff members have implemented many recommendations and others are in process, but it is too early to evaluate the impact of these changes. It is important to point out that two recommendations appeared in all three data collections – improve marketing and create online searching tips and/or tutorials, especially for use when the library is closed.

The research findings have confirmed many things for the library. First, the majority of respondents are satisfied with the library’s services and resources. Second, faculty members are the gateway to the students. A motivating factor in student library use is the requirement to use the library for their coursework. Third, both students and faculty members learn about the library through the library’s website. Providing a website that is easy to use and includes quality information and resources is essential. Fourth, students who attend a research education class express satisfaction with the class and utilise what they have learned. Efforts to address the differing experience levels of the students in the research education classes and to broaden teaching techniques will continue.

It is rewarding to provide new or improved services and resources based on actual data about library users’ needs. Regular application of these three data-collection instruments, one per year on a three-year cycle, will enable library managers to respond quickly to changing user needs and expectations. As the library redefines the questions it wants to ask, the focus of the instruments will vary to understand these changing user needs. Library staff may eventually be able to take over much of the work, but for the near future FERA’s expertise will be needed to collect and analyse the data, and to help library managers create actionable recommendations. The data (what) and the implications (so what) are meaningless without the final step of acting on the recommendations.
(now what). Acting on a continuous stream of user feedback will enable the library to remain a relevant campus service and resource.

**Exercise C**

*Elizabeth Connor*

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define actionable data.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Explain the similarities and differences between actionable data and evidence-based practice.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to the use of continuous quality improvement. Look at LibQUAL+ sample data (<a href="http://www.libqual.org/">www.libqual.org/</a>).</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other types of libraries or institutions that would benefit from similar approaches.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research, following the what/so what/now what pattern. Think of a few approaches that may increase student and/or faculty participation in library survey activities.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)

**References**

2. Ibid.


Evidence-based librarianship Down Under: improving a nation’s resource-sharing

Roxanne Missingham

Once upon a time in a land far, far away the library staff decided to cast a spell to help everyone get the library materials they needed. They worked to deliver easy and rapid access to material from all libraries across the nation. All the library fairies worked together to find out how they could operate better to achieve the best service.

This is the story of how Australian resource-sharing took a major step forward through a national benchmarking study. It also reports on an evaluation of the impact from an evidence-based librarianship approach using a survey and data from libraries in 2006. Improvements in practice from the national study are evaluated in terms of the outcomes for library users and libraries. The chapter concludes with analysis of where future benchmarking and system developments are required.

Introduction

Library staff have, over the past decade, been involved in a radical revolution of the ways they deliver service to users. They have invested considerable resources in investigating ways to improve access services for users to resources wherever they are. Innovative solutions to ‘breaking down our walls’ by providing digital access have been implemented by libraries in all sectors.

One library operation which has been a ‘Cinderella’ of sorts, quietly working away on the background, is resource-sharing – interlibrary
lending and document supply – providing users with loans and copies from other libraries. The sharing of resources through this service, which will be referred to as interlibrary lending in this case study, is a traditional library activity. It has sometimes been thought of as a backroom operation, alternatively as a service which will wither away and die:

The second change in information technology is the ability to digitize information. This will lead interlending and document delivery in entirely new directions. More precisely, it will influence only document delivery, because it may make the traditional interlending obsolete.¹

Despite this prediction, as ‘no man is an island’, no library can completely serve all the needs of all its readers with its collection. In Australia national cooperation for access to collections has been a major feature of the library landscape. Professor Schreuder, vice chancellor of the University of Western Australia, noted:

No library can ever meet all the needs of all its users. So the ability to request to see books from other libraries, or to receive photocopies of articles from journals held by other libraries, has been essential to the way in which many scholars conduct their research. Australia, with its national bibliographic database, and a history of leading-edge investment in the supporting technology, is well-placed in this area.²

Interlibrary lending is important to libraries and users, and fundamental to the operation of libraries in Australia, and is an area that can be continuously improved. Australian libraries have committed to review and improve performance over the past decades.³ A recent major national project is an example of applying a new concept for service improvement: evidence-based librarianship (EBL). So what is EBL? Eldredge suggests:

The EBL process enables health sciences librarians to integrate research findings into their daily practice by focusing upon a specific problem in need of immediate attention. The EBL process consists of formulating a practical question, searching for the evidence needed to answer the question, and systematically evaluating the gathered evidence for its usefulness and validity for answering the initial question.⁴
Brice et al. note that ‘EBL aims to increase the skills of librarians in reading, interpreting and applying their professional research literature’. This chapter outlines a study of interlibrary lending in Australian libraries which involved a national project obtaining information. These data were then analysed to determine the answer to a practical question (what makes a top-performing interlibrary lending operation?), how the findings of the study were implemented and whether the application of the findings of the study resulted in significant improvements to interlibrary lending.

Interlibrary lending in Australia

Australian libraries have a long history of cooperation and resource-sharing, no doubt developed because Australian libraries are spread across a large nation. In addition, their collections were built relatively recently. The first library was established in Australia in 1809, an ambitious but unsuccessful start, and in the 1820s subscription libraries were established. With such a recent history, cooperation was essential to providing services with limited budgets and delays in obtaining material from other libraries across the oceans.

While there has been a recent declining trend in requesting and supplying interlibrary loans, it remains an important service for all Australian libraries, generating approximately 1 million transactions per year. The decline is most closely related to the purchasing by Australian research libraries of large e-collections such as ScienceDirect and JSTOR, which enable users to access a wider range of resources through their own libraries. Interlibrary lending does, however, remain a fundamentally well-used service, as demonstrated by the statistics collected by the university library sector.

Interlibrary lending is a critical service to the users of Australian libraries in all sectors, and it is important to end users. A study of English and psychology researchers found ‘50% of the research being conducted in English and Psychology in Australian universities relied on interlibrary lending’. Scientists similarly reported that interlibrary lending was critical to their work. Another study found 48 per cent of biologists but only 20 per cent of physicists use interlibrary loans/document delivery at least ten times per year. Both studies reported significant problems with the speed and quality of interlibrary lending services.
Evidence-based librarians and interlibrary lending

Eldredge has proposed a seven-part conceptual framework for EBL. Point one is that ‘EBL seeks to improve library practice by utilizing the best-available evidence combined with a pragmatic perspective developed from working experiences in librarianship’.\(^{10}\) Australian libraries were fortunate in seeking to study interlibrary lending because they could ask pragmatic questions about improving service while knowing that users had already identified that the service did not meet their expectations.

More significantly, Australian libraries were able to use an established methodology which had been developed by the Association of Research Libraries (ARL).

Eldredge’s second point that ‘EBL applies the best-available evidence, whether based upon either quantitative or qualitative research methods\(^{11}\) was achieved precisely by using an accepted methodology to obtain the best possible evidence. The ARL’s Committee on Access to Information Resources held discussions on the changes that needed to be made to the whole environment in which the interlibrary lending service is provided.\(^{12}\) Discussion led to a proposal that there be an ‘ideal system’ which is directly accessible to the client, is fully automated and provides an effective and efficient system for the library and client. The ARL conducted a major project in 1996 to answer the following question: ‘What are the characteristics of a cost-effective interlibrary loan (ILL) and document delivery (DD) operation?\(^{13}\)

This study developed a methodology that could be used to assess interlibrary lending services. It measured service characteristics such as unit cost, fill rate and turnaround time for mediated and user-initiated interlibrary borrowing and lending. Information from the study could be used to improve the performance of all libraries.

With a high degree of interest in Australia in resource-sharing, an agreement that improvements in interlibrary lending were a priority and the development of this methodology, it was opportune to assess performance and ‘ideal performance’ in a way not possible before. In 1999 Australian libraries agreed to undertake a national study.
The Australian ILL study

The National Resource Sharing Working Group (www.nla.gov.au/initiatives/nrswg) actually commissioned the study. This group was established in 1999 with representatives of library sectors and professional groups; its purpose was to monitor interlibrary lending standards, practices and policies and ensure that these continue to meet changing user needs and new technologies. In recommending that a benchmarking study on interlibrary lending be undertaken, the working group was assisted by the National Library of Australia, which conducted the study. The three key objectives of the study were to:

- identify the characteristics of high-performing interlibrary lending operations;
- serve as an instrument for raising awareness and changing interlibrary lending practices;
- provide a standard set of data to assist libraries to benchmark their operations.

It was a mammoth study with over 100 libraries across Australia participating, including 30 special libraries, 32 of the 37 universities, 20 public libraries, all state and territory libraries and the National Library. The final report was published in 2002, as considerable time was required for analysis. The full report is available online, and a detailed report on how the study was undertaken and key results is also available.

The data collected through the survey, comprising over 25,000 pages, were entered into spreadsheets by National Library staff. Data were checked and analysis commenced. A government statistician from the Australian Bureau of Statistics undertook the data analysis and used logistic regression modelling to identify possible relationships among variables. Fifty variables were included for requesting activities and 42 for supplying activities. The key performance measures were turnaround time, fill rate and unit cost for requesting activities, and fill rate and unit cost for supplying activities.

This approach also matches Eldredge’s third principle: ‘EBL encourages the pursuit of increasingly rigorous research strategies to support decisions affecting library practice.’ The detailed analysis and testing of questions through the international community gave a degree of rigour that Australian interlibrary lending studies had not applied until that time.
The performance of all libraries was analysed in relation to the overall results of Australian libraries. Interestingly, no library came in the top 10 per cent in every category, indicating that every library could improve its performance. Data analysed included the following.

- **Turnaround time** (the period between the user requesting and receiving an item). Performance was considerably varied. Special libraries had the fastest and public libraries the slowest turnaround times. This is likely to be related to the nature of the service in these library sectors, with public libraries giving a high priority to obtaining a loan or document for free and special libraries emphasising speed.

- **Fill rate** (success in obtaining an item). There was only a small variation in the percentage success rate for the library sectors. Overall the key factors were automation, automation and automation.

- **Costs.** The cost of interlibrary lending was analysed for each major cost component and sector. The major cost was staff – comprising approximately 90 per cent of the total cost of interlibrary lending.

- **Users’ views.** The user survey revealed a high level of satisfaction with the service, with over 95 per cent satisfied. The major areas of concern identified were the poor quality of some documents and a desire for electronic delivery. Users rated improved speed of delivery higher than improved quality. Tracking requests was an area where users wanted to be able to use online systems to monitor the progress of their requests.

In the final analysis, five key performance factors were identified from the study for top performance.

- **Examine workflows to ensure there are as few steps as possible involved in the ILL/DD process.** The most efficient libraries had the least number of steps involved in obtaining an item.

- **Implement an automation package or include an ILL module in the next tender for a library system.** It was clear under every performance criterion that libraries need to automate their interlibrary lending processes to become efficient and effective. Automation literally saves days in turnaround time and reduces unit costs for requesting and supplying.

- **Ensure ILL/DD staff are well trained in the resources and systems used.**

- **Add and maintain holdings on union catalogues.**

- **Investigate options for cooperative agreements with key requesting and supplying libraries.**
Implementing the results of the study

Perhaps the most important component of EBL is turning research evidence into practice. The interlibrary lending benchmarking study provided a wealth of information about high-performing interlibrary lending areas. A major challenge for the National Resource Sharing Working Group was to find ways to encourage Australian libraries to put the study findings into action by adopting best practices.

The working group took a three-pronged approach. It promoted the findings of the study directly to libraries and associations, presented workshops for practitioners and policy-makers (including making the documents for the workshop freely available on the web to enable self-paced learning) and encouraged best-practice libraries to promote their work practices. All participants in the study were provided with a report indicating how their performance compared to libraries in their sector and to the whole survey group. Library automation issues were referred to the National Library for improvements in the national automated interlibrary lending system and the national union catalogue.

A series of workshops was held around Australia to promote the results of the study and encourage best practice. Approximately 500 library staff attended the workshops, including policy-makers and practitioners from all library sectors. Libraries which had not participated in the study were able to attend the workshops to improve their practice. The workshop manual was published online, making it available to all Australian libraries. It was particularly valuable to remote and regional libraries that were unable to send staff to attend the workshops.

Presentations were made at library conferences, and to state, university, public and special library meetings. Perhaps the most significant event for sharing information for those wishing to implement best practice, particularly automation, was the national forum and field day held on 11–12 November 2002. This forum enabled discussion of the findings of the study, and shared information on possible new models for resource-sharing and ideas for improving library activities. The field day was held on the second day. It was an opportunity for library staff to see demonstrations of automated systems for interlibrary lending. Presentations from the event were published on the web17 for wider access by library staff, particularly those who were unable to attend; thus the opportunity to learn was provided to the whole Australian library community.

The National Library of Australia reviewed its support for resource-sharing, the union catalogue and automated interlibrary lending system. An expert advisory group was created to review issues
and recommend developments to the national system. The group researches issues and proposed 13 recommendations that focused on improving the systems, marketing services and engaging with end users and libraries about their future needs. These recommendations were all accepted by the National Library.

Eldredge has predicted that the longer-term trend will be to develop ‘practice guidelines, some based upon higher levels of evidence, [that] will inform daily decisions in health sciences librarianship’. The practice guidelines developed from the benchmarking study were shared with libraries in the form of the workshop manual and workshops. This represented a new application of EBL for Australian libraries.

What has been achieved – was the project successful?

In 2006 an evaluation of the outcomes of the benchmarking report and subsequent activities of the National Resource Sharing Working Group was undertaken. The evaluation was designed to:

- assess the improvements in the performance of interlibrary lending in Australian libraries due to the benchmarking study;
- determine the effectiveness of the actions undertaken to improve national performance;
- assess performance improvements to the user.

The methodology chosen was a survey instrument which was constructed using some of the same questions as the original benchmarking study for comparative purposes. As with the benchmarking survey, it was promoted widely through e-lists. In addition, assessment of changes in interlibrary lending was undertaken using statistical information from the national system.

One hundred and sixty-one libraries from all sectors completed the survey. The composition by library sector was roughly comparable to the earlier study; however, there were proportionally fewer university libraries and more special libraries. Participation in activities generated by the benchmarking study was relatively low:

- 51 per cent (83) of the respondents had participated in the benchmarking study;
- 33 per cent (53) had participated in the training (40 of those which had participated in the study and 13 which did not).
The following survey results show actions taken to implement best practices. Additional information is provided on factors that can be measured from participation in the national interlibrary lending system.

**Examine workflows to ensure there are as few steps as possible involved in the ILL/DD process**

Of the 161 respondents, 72 (45 per cent) reported reviewing their interlibrary lending operations in response to the survey. Interestingly, the comments revealed that eight libraries were already reviewing their interlibrary lending operations, therefore approximately 50 per cent of respondents have examined and reviewed their interlibrary lending operations formally since the publication of the benchmarking study. Activity varied by sector: 86 per cent of national/state/territory, 72 per cent of university, 48 per cent of public and 40 per cent of special libraries reviewed their operations.

Review of interlibrary lending operations was strongly related to participation in activities from the benchmarking study. Of those which reviewed their operations, 58.3 per cent participated in the training, 72.2 per cent participated in the benchmarking study and 12.5 per cent did not participate in the training or the survey. Overall, libraries that participated in the training and the benchmarking survey were more likely to have reviewed their operation and implemented an automated interlibrary lending system.

**Implement an automation package or include an ILL module in the next tender for a library system**

Automation of interlibrary lending is a complex issue. There are currently over 550 libraries in Australia using the national automated interlibrary lending system. For the majority of these libraries, it is the only automated interlibrary lending system that they will be able to afford to implement because of resource considerations (staff time and technology). The number of libraries using the national system has risen steadily over time at around 20 per year. In 2005 after a change to the pricing policy, which eliminated charges for individual transactions, the membership of the service grew by over 30, suggesting that costs and best practice are not always directly related.
Large libraries and library consortia generally purchase automated systems which they can install locally or run on a bureau basis. The most significant automation project in Australia has been the LIDDAS project, which resulted in the implementation of the Fretwell Downing Virtual Document Exchange (VDX) software in 17 university and state libraries with interconnectivity using the ISO ILL protocol. The survey found that:

- 45 per cent implemented an automated package;
- 71 per cent of university libraries had automated interlibrary lending, significantly higher than in other sectors – 51 per cent of public libraries, 43 per cent of national/state/territory libraries and 29 per cent of special libraries;
- 52 per cent of those which participated in the benchmarking study had implemented automated systems;
- 34 per cent of libraries that automated had not participated in the benchmarking study.

Automation ranged from automated patron requesting through a web form (66 per cent) to interoperation with the National Libraries Australia Document Delivery System (43 per cent). An additional 35 libraries indicated that they planned to implement an automated interlibrary lending system – making a total of 65 per cent of survey respondents which will have automated systems within the near future. Information from the National Library of Australia on use of the national interlibrary lending systems reveals that 23 per cent of the current traffic is from libraries using their own automated systems. This recommendation from the benchmarking study has seen considerable progress, which can be measured in terms of using automation to manage a significant and increasing number of transactions. Interestingly, the recommendation required action by the national system as well as libraries acquiring systems to implement automation of this activity fully.

**Ensure ILL/DD staff are well trained in the resources and systems used**

Training is primarily a local issue for ILL staff. It can be argued that the first step towards this was involving ILL staff in reviewing their operations through the training provided by the National Resource Sharing Working Group, which enabled over 500 to acquire new skills. The survey did provide valuable information on developments in this area:
59 per cent of respondents indicated that they had provided training for their staff, strengthening their professional skills;

- this was most significant in the university (72 per cent) and national/state/territory (80 per cent) sectors, less so in public (48 per cent) and special (45 per cent) sectors.

Interlibrary lending staff are generally employed at lower classifications and their training needs to be focused on the systems they operate. In general, centralised interlibrary lending operations and larger libraries are able to offer more extensive training. Responses to this question are generally in line with the number of libraries that implemented automated systems and reviewed their practices.

Add and maintain holdings on union catalogues

The largest union catalogue in Australia is the national union catalogue maintained by the National Library of Australia. Launched online in 1980, the catalogue has grown from consortial or major research libraries to include libraries from all sectors. While contribution has been actively promoted as beneficial to all libraries, public and special libraries are not all recorded. Eighty-one per cent of survey participants were contributing to the national union catalogue or other union catalogues. Participants had over 60 million titles, which stands in contrast to the slightly more than 40 million holdings recorded on the national union catalogue. Clearly more action is required to improve coverage of the catalogue.

The importance of the union catalogue is emphasised by a study of university library holdings in Australia which found a high level of collection uniqueness.\(^{22}\) Uniquely held materials are a significant part of the Australian collection. Public libraries have extensive collections of local history materials which often have limited print runs and distribution. State and national libraries have unique materials such as manuscripts and pictures.

Investigate options for cooperative agreements with key requesting and supplying libraries

Libraries have cooperated through a range of mechanisms, more often than not informal in nature. The survey found that 56 per cent had investigated cooperative agreements with other libraries. The majority exploring these options were special and university libraries.
Impact of the project

The 2002 study and activities to improve the interlibrary lending performance of Australian libraries represented a major undertaking. The concept of collecting evidence on practice, determining best practice factors and encouraging the adoption of these demonstrates evidence-based practice at a national level. Perhaps the major question is what has been achieved for library users through this exercise. The survey revealed a significant improvement in the delivery of loans and copies to users (see Figure 5.1).

The data show a major improvement in delivery. The public library sector shows the greatest reduction in turnaround time. This is a significant improvement in service, meeting the criterion identified by users as most critical. In addition, librarians thought fill rate (successful supply of requested material) had improved. Therefore, in terms of measuring the outcomes of the service for users across Australia, the benchmarking study achieved a considerable improvement in practice.

One of the goals of the benchmarking exercise was to reduce the costs of interlibrary lending activity. When asked in the 2006 survey whether costs had reduced, librarians did not find this had occurred. There are two possible reasons for this. As noted in the previous study, the most significant driver of interlibrary lending costs is staff. As salaries have risen over time, there has undoubtedly been an increase in the cost of the
activity. Also, a number of libraries have acquired automated systems which required an investment of funds. It is not clear from the data collected whether the efficiencies gained through applying the results of the benchmarking study have reduced the increase in costs which would have been experienced in interlibrary lending had practices continued as they were. Overall the results indicate that unit costs have increased the most in the special library sector, which had low costs already. The majority of library costs have not changed or decreased, or were not known.

**Was it all worthwhile?**

Eldredge proposed that:

EBL represents a global approach to information seeking and knowledge development, involving research but not restricted to research alone;

EBL supports the adoption of practice guidelines and standards developed by expert committees based upon the best-available evidence, but *not* as an endorsement of adhering to rigid protocols.\(^{23}\)

The interlibrary lending project has demonstrated an approach to improving performance based on research and engagement of all library sectors in debate and discussion. The setting of a new national interlibrary lending code\(^ {24} \) in 2006 with significantly reduced turnaround time may be seen as going beyond research to leadership using EBL. A commitment to further development in interlibrary lending achieved at a 2006 national consultation forum at the National Library suggests the guidelines that have improved practice are not being adhered to rigidly. The development of better loan services is next on the agenda and will enable stronger international links with the Rethinking Resource Sharing Group.\(^ {25} \)

Dempsey has suggested:

Libraries have rich deep collections, and the aggregate library system is a major achievement. However, in our current network environment, libraries compete for scarce attention. This suggests
that if the ‘library long tail’ is to be effectively prospected then the ‘cost’ of discovering and using library collections and services needs to be as low as possible.26

This underlines the importance of considering developments to improve collection access for users and libraries. With the increasing popularity of Google and other internet search engines, librarians need to promote the easy location and delivery of materials from their collections and other libraries through interlibrary lending. Interlibrary lending is an established method of providing such an integrated service. Increasing access to resources will demonstrate the relevance of libraries and also ensure that librarians hold significant roles in the new information landscape.

For all these future directions, the collaborative use of a benchmarking exercise to review service quality has provided a basis for understanding issues and a mechanism for investigating and developing services. EBL has provided the cornerstone of developments which benefit users and libraries.

Exercise D

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define interlibrary lending and document delivery.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Compare this study to benchmarking of interlibrary lending processes conducted in other countries. Explain the significance of national resource-sharing.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to studying turnaround time, fill rate, costs and user satisfaction.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other library services that would benefit from similar approaches.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)
References


9. Ibid.

10. Eldredge, ref. 4 above.

11. Ibid.


16. Eldredge, ref. 4 above.


23. Eldredge, ref. 4 above.


A new paradigm for morning report: a collaborative effort between the Department of Internal Medicine and the Medical Library

Donna F. Timm, Daniel E. Banks, Kerri Ann Christopher, David C. Duggar, Marianne Comegys, Runhua Shi and Jerry McLarty

Introduction

Morning report has been a part of internal medicine education for many years. Despite its use across departments of medicine in the USA, there is no proven ‘best’ way to fulfil the goals of this educational session. In some hospitals the meeting is a review of the numerous admissions which have occurred over the past 24 hours within the department of medicine. In other hospitals it might be a formal presentation of a recently admitted case with the diagnosis in evolution, or a case which has some ‘unusual features’ that are considered to be of interest and relevance to the house officers’ education.

Regardless of the format, the main objective is to improve the standard of care, with a house officer presenting the case in a well-organised manner so that all participants might learn to deal more effectively with the variety of issues they will encounter in the course of managing a patient’s case.1

In the 1960s morning report was a product of the public hospital training system. In this system, patients were admitted without the assistance of attending physicians, and patient management was completely the responsibility of the house officer. On the day after
admission the patients were presented to the internal medicine chairman who was ultimately responsible for the care of all patients. In the 1970s DeGroot and Siegler observed that morning report reflected the new trends in medical education: the retreat from the bedside to the conference room and the development of camaraderie between house officers and faculty regarding the care of patients. Since then, the social aspects have remained as well as the focus on the supervision of care, with an emphasis on the discussion of interesting topics and uniquely ill patients.

**Objectives of morning report**

It is generally assumed that morning report, regardless of its format, educates physicians. Morning report plays an important role in the education of house officers. According to Parrino and Villanueva, it is an integral part of almost all internal medicine training programmes. Wenger and Shipner discuss morning report as an educational process by which house officers work through the diagnostic puzzle, learning that the cases presented do not have tidy solutions. Morning report assists house officers with the development of diagnostic skills, showing them how the initial morning report diagnosis may sometimes differ from the final diagnosis as established by six-month follow-up.

There is some reason to think that the presentation of cases in a ‘real-time’ format can enhance active learning. This approach allows for new steps in reasoning as each new piece of information is revealed. As data are revealed, participants can then be asked for the next best steps. This approach may not only make the discussion more interesting but may also develop the house officers’ problem-solving skills.

**Expectations of house officers**

While there is no agreement as to the best way to present the hour of education, a summary of expectations by house officers attending these presentations has been reported. In a survey of resident attitudes towards morning report, Ways et al. noted that residents consider it to be a valuable learning experience and place a great deal of importance upon an interactive discussion that focuses on listing the differential diagnosis and evaluating the appropriate use of diagnostic tests. The residents also prefer attendance by physicians who bring a broad knowledge base to the discussion.
In a multi-centre survey of house officers in internal medicine training programmes, the house officers preferred that half of the guest attending physicians be generalists and preferred the discussion of the management of a few interesting cases rather than a review of all cases admitted the previous day. House officers preferred a stepwise presentation of information which simulated the way that the case presents in the admitting area (i.e. first the history, then the physical, then laboratory data, then imaging information). House officers seemed less interested in discussing medical ethics and research methods. Responses varied little when broken down by gender, year of internal medicine training, whether the resident wished to be a generalist or sub-specialist or the location of the training programme.

Another goal of morning report is to develop and improve the presentation skills of house officers, with the expectation that they will not only provide a ‘snapshot’ of the patient but will also take an evidence-based approach to the case presentation. Within this scenario, house officers are expected to locate the supporting literature for the cases presented and critically appraise the relevant articles.

Harris has provided insight into the process of morning report, beginning by citing references which reflect intimidation in the education of house officers during the presentation of cases. Rather, there should be a positive learning climate where the house officers can both learn and teach in a non-intimidating environment. The chief resident needs to play a leadership role in planning and organising the session, ensuring that the attendees arrive on time, the discussion is inclusive, the presenter is supported and the ‘ebullience of the chairman’ and/or programme director is suppressed. In addition there is a need for self-directed learning, where the chief resident, with the support of the faculty, can encourage house officers to take initiative in studying the medical literature. The importance of self-directed learning is reinforced by the Accreditation Council for Graduate Medical Education’s recognition of ‘practice-based learning’ as one of the six general competencies for resident development.

The question is whether the morning report discussion affects patient outcome. Despite numerous reports addressing the effects associated with the presentation of patients at morning report, how will these patient outcomes be measured? At Louisiana State University Health Sciences Center, with the support of the librarians and the use of their expertise in searching the medical literature, a programme was structured to identify and answer deficiencies in the house officers’ knowledge of each newly hospitalised case discussed. The house officers
and librarians addressed computer-based queries, disseminated information immediately to the care providers and defined whether this approach altered the cost of the patient’s total hospital charges and/or length of stay in the hospital.

**Role of the librarian at morning report**

Clinical medical librarian (CML) programmes were first reported in 1971\(^{15}\) as a way of integrating into the patient care setting the librarian’s ability to search the medical literature, with the goal being for the physician to apply the best evidence from the literature to improve patient care. For physicians to apply the best clinical evidence in a patient-centred manner, there are two critical skills to master: the formulation of clearly focused clinical questions and the execution of search strategies that retrieve the best available medical evidence.\(^{16}\) Librarians can be instrumental in assisting physicians with acquiring the skill set that will facilitate the retrieval of pertinent information to be incorporated into the clinical decision-making process.

To accomplish this goal, physicians and librarians have worked together in a variety of settings, from librarians accompanying physicians on rounds to attending teaching conferences or morning report sessions.\(^{17}\) Whatever the setting, the librarian also saves the physician time by either performing the literature searches or training the physician to search the medical literature in an effective, efficient manner.

Slawson and Shaughnessy have suggested that librarians and physicians (as well as medical students and residents) should also work together to go beyond finding the best evidence to being taught information management skills by librarians. This would include teaching physicians to use tools that help them stay abreast of current developments, find information quickly at the point of care and make patient management decisions when the best evidence is critically evaluated in conjunction with patient preferences.\(^{18}\) This is a worthy endeavour in light of the fact that lifelong learning is an inextricable part of the practice of medicine in the twenty-first century. In fact, Dorsch et al. stated that it is imperative for every medical student to learn how to retrieve the supporting literature to answer questions that impact on patient care and ‘to foster the habit of lifelong learning’.\(^{19}\)

There has been considerable discussion about physician interaction with librarians in terms of searching the medical literature, but not as much information has been presented about the librarian’s role in
affecting patient outcomes through locating the supporting literature for cases presented at morning report. There have been, however, several studies that emphasised the librarian’s impact in terms of providing information that may have altered patient care.

In 1986 King reported the impact of hospital library services on clinical decision-making. In this study, 310 physicians were surveyed to determine whether the information provided by the library changed the management of their patients. Of the 176 respondents, 74 per cent confirmed that the information provided by the library made a difference in patient care. From 1990 to 1991 Marshall conducted a study with a similar design that surveyed 448 physicians. Of the 208 respondents, 80 per cent responded affirmatively when asked whether the information provided by the library would have altered the care of their patients.

The role of librarians within the context of morning report was described by Barbour and Young in 1986, focusing on the enhancement of the educational value of morning report due to the evaluation of the medical literature. Clinical librarians provided MEDLINE searches and references on a daily basis, with the house staff reporting that the literature was of value in making patient care decisions. Although the number of house staff participating was not described, 76 per cent responded to a questionnaire about the CML programme, and 95 per cent of the respondents found the literature to be of clinical value in the diagnosis or treatment of patients.

From 1989 to 1990 Klein et al., in a study undertaken outside of the clinical case review of morning report, found a significant effect of librarian-generated MEDLINE searches on hospital charges and length of stay. MEDLINE searches were conducted for 192 test patient cases, and no searches were conducted for the 10,000 controls. The study design did not control for age or number of concomitant diagnoses, and matching was done by diagnostic groups only rather than by the International Classification of Diseases (ICD-9) codes.

The goal of reporting librarians’ participation in morning report at the Louisiana State University Health Sciences Center is to show that information provided when the library faculty and physicians work together to locate the best supporting literature for cases presented at morning report definitely can have a positive impact on hospital charges and length of stay. Added benefits have been the opportunity for librarians to assist the physicians with improving their search strategies and to increase the librarians’ visibility with the physicians in the Department of Medicine.
Morning report at LSU Health Sciences Center

The overall purpose of morning report in the Department of Medicine at the Louisiana State University Health Sciences Center in Shreveport (LSUHSC-S) is to teach the house officers how to analyse the presented case logically and identify the correct course to take in determining the diagnosis and treatment options. This chapter describes the ongoing collaboration between the Medical Library and the Department of Internal Medicine physicians to affect patient outcomes within the context of morning report.

The motivation for this collaboration was the result of a pilot study undertaken to evaluate the educational usefulness of a computerised search of two questions. Jointly formulated by the presenting house officer and the senior members of the medicine faculty, developed at the end of morning report, these queries tested whether the supporting literature would add to the educational content of morning report.

At morning report, each inpatient case is presented in detail by the house officer who did the evaluation. In addition to a discussion of the chief complaint, history, physical findings and presentation of laboratory data and radiographic imaging information, a tentative diagnosis is discussed and a plan of therapy put forth. At the end of the hour the faculty physicians and presenting house officers ask two questions based on the data presented.

Answering these clinically oriented questions is a way to incorporate evidence-based medicine into daily practice. After several months of morning report case presentations, a questionnaire was developed and administered to 60 house officers to test the impact of the supporting literature on patient management. Among the 33 who replied, 24 stated that they read the medical literature e-mailed in response to these questions. Thirty-one responded to the query as to whether this information altered patient care: 17 reported in the affirmative, with seven noting that they ordered different laboratory tests, five changing their diagnosis and ten altering the therapy provided.

Another informal survey was conducted near the end of the morning report study that requested house officer comments on the quality of the supporting literature for 105 cases presented at morning report. Based on these cases, 45 of the house officers (almost 43 per cent) surveyed offered no comments about the supporting literature. Others did make comments: 43 of the respondents stated that the literature had a positive impact on their approach to the cases.
influence on patient management, seven stated that the literature had no influence on patient management and ten said that while the literature had no direct influence on patient management, it provided excellent background information that increased the house officer’s knowledge of a given disease or disorder.

While there is considerable information suggesting that morning report is a worthwhile educational tool in the maturation of house officers as physicians, it is important to show hospital administrators the benefits of the sessions. In the face of increasing costs necessary to manage training programmes, identification of the benefits of educational programmes which lessen the cost of care is attractive to the administrators of medical education and can help hospital administrators justify the cost of training programmes such as morning report. Finally, the development of an intervention which is associated with library searching supports the practice-based learning competency – one of the six competencies for residents required by the Accreditation Council for Graduate Medical Education (ACGME).

**Methodology**

The LSUHSC-S is a 420-bed ‘safety-net’ hospital in which the Department of Medicine manages approximately 7,000 inpatient admissions and more than 86,000 outpatient ambulatory visits annually. A full-time faculty of approximately 60 general and sub-speciality internists supervise nearly 70 internal medicine house officers as well as numerous third- and fourth-year medical students. Patients are assigned to one of seven teams; one of four general internal medicine teams, or a sub-speciality cardiology, oncology or nephrology team. Average daily census approximates 16 patients per general medicine team. Teams are comprised of a faculty member, a resident, two interns and third- and fourth-year students. There are about 30 attendees at morning report. These include four or five internal medicine faculty, a librarian and approximately 25 house officers spread relatively evenly over the three-year training period.

The partnership between the training programme and the library faculty began with the education of the incoming 2004/2005 internal medicine residents in June 2004, coinciding with the beginning of this study. The study required that patients presented at morning report be among those admitted to the hospital during the previous 24 hours. This allowed any discussion of proposed changes made during morning
report, as well as insight gained from the articles, to be made in ‘real
time’. Although at the time of presentation some of the laboratory results
and imaging studies might be incomplete, discussing these newly
hospitalised patients allowed an opportunity for the articles selected
from the medical literature to affect patient care directly.

Patients were presented by the house officers with no prior
instructions as to which case to select or type of illness to present. It was
the prerogative of each house officer to choose morning report cases
upon the basis of his/her interest in the patient’s illness. Neither the
attending faculty physicians nor the authors of this chapter influenced
the selection of cases presented at morning report.

Immediately following morning report, the faculty librarian, with the
clinical guidance of the Department of Medicine chairman or the chief
resident, conducted an online search of the medical literature to identify
article citations that answered two questions posed at the end of the
session. While full-text articles were preferred, the best articles that
answered the questions were selected. Print copies of all selected articles
were posted on a bulletin board easily accessible to the house officers.

Once the articles were chosen, a brief summary of the case with the
two questions and the abstracts of the selected articles were disseminated
by e-mail with hypertext links to the full-text articles, when available.
The distribution list consisted of all Department of Medicine faculty,
residents and fellows regardless of their rotation. Photocopies of the
selected articles were hand-delivered to the presenting house officer by
10am so that he or she could apply the knowledge gained from the
literature to improve the patient’s care. Because the patients were
presented by house officers who had just completed overnight call, the
30-hour work limit (mandated by the ACGME) was in effect and a
prompt turnaround time was of the essence.

The protocol for this study was approved by the LSUHSC-S
Institutional Review Board. From August 2004 to March 2005 105 cases
were presented at the daily morning report. The comparison group was
drawn from a pool of 19,210 inpatients who had been hospitalised on
the medicine service at LSUHSC-S in the previous five years.

This population of internal medicine patients has numerous medical
problems. The diagnosis that was responsible for the hospitalisation is
reported as the primary diagnosis. Additional diagnoses are also
listed and considered ‘secondary diagnoses’. The total number of
secondary diagnoses are counted. One of the criteria for matching is that
the difference in the number of secondary diagnoses between the
‘presented morning report case’ and the comparison case is three or
fewer. In summary, the morning report cases and the members of the comparison group were matched exactly by their primary, three-digit ICD-9 codes, age within five years and number of secondary diagnoses (within three).

Student $t$-tests and chi-squared tests were used, where appropriate, for an unmatched analysis of differences between the morning report group and the comparison group. For the matched analysis, the outcome variables of interest – length of stay (LOS) and total hospital charges – have a skewed distribution; therefore, non-parametric methods were used in the analysis. Both the Wilcoxon paired-sample test and the sign test yielded similar results. Since there were a variable number of controls per case, an average value was used for LOS and total charges for the comparison group. Values of the outcome measures were expressed as median rather than mean because of the asymmetric distributions of LOS and total charges. Means are highly susceptible to extreme values and outliers, whereas medians are not. Group differences also are expressed as the median of the paired differences. Probability values less than 0.05 were considered to be statistically significant. The two outcome measures used were LOS and total charges for hospitalisation. Physician charges were not included.

**Results**

A summary of demographics for the 55 cases and 136 matched controls shows no statistically significant differences between the two groups with respect to age, race, sex, number of disease diagnoses, insurance coverage or marital status for the unpaired data. The median ages are 50.0 and 50.5 for the morning report group and the comparison group, respectively. The median numbers of secondary diagnoses are 6.0 and 5.7 for the morning report group and the comparison group, respectively. Also, within the matched pairs there were no statistically significant differences between the morning report and the comparison group with respect to age or the number of diagnoses.

As shown in Table 6.1, LOS differed significantly between matched cases and controls ($p<0.024$). The median LOSs are three and five days for the morning report and the comparison group, respectively. This difference is highly statistically significant ($p<0.002$). Table 6.2 shows the median total hospital charges are $7,045 and $10,663 for morning report and control groups, respectively.
Table 6.1  Total days of stay per hospitalisation
(N = 55 matches)*

<table>
<thead>
<tr>
<th></th>
<th>Morning report group</th>
<th>Matched comparison group</th>
<th>Difference</th>
<th>Probability value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>6.85</td>
<td>7.22</td>
<td>–0.37</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>3.00</td>
<td>5.00</td>
<td>–2</td>
<td>0.0238</td>
</tr>
<tr>
<td>SD</td>
<td>10.18</td>
<td>5.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1.0–59.0</td>
<td>1.33–33.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Wilcoxon signed rank test

Table 6.2  Total charges per hospitalisation (N = 55 matches)*

<table>
<thead>
<tr>
<th></th>
<th>Morning report group</th>
<th>Matched comparison group</th>
<th>Median of difference</th>
<th>Probability value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>$15,142.88</td>
<td>$14,951.49</td>
<td>–$191.38</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>$7,045.11</td>
<td>$10,663.06</td>
<td>$1,392.48</td>
<td>0.24</td>
</tr>
<tr>
<td>SD</td>
<td>$22,401.4</td>
<td>$13,312.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>$2,295.4–135,892.4</td>
<td>$2,344.76–58,687.19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Wilcoxon signed rank test

Figure 6.1 illustrates the range and distribution of LOS data and the positive effects due to the morning report (matched pairs of morning report and control group patients). Both axes are logarithmic scales, due to the extreme range of the data points. Points below the line indicate a shorter LOS for controls; points above the line indicate a longer LOS for controls. The diagonal line is where pairs would lie if there were no difference. The number of points above the line (35) is more than twice the number below the line (16); four pairs are on the line. This corresponds to a simple sign test which is statistically significant (p = 0.012). This means the LOS was significantly less for the morning report patients than for the comparison group patients. The correlation between matched pairs also was highly significant (p<0.001). A similar, though not statistically significant, relationship is shown in Figure 6.2. In this scatter-plot the number of points below the line reflect the number of cases presented at morning report with a lesser cost of care; points above the line indicate a greater cost of care. The diagonal line is where pairs would lie if there were no difference. The number of points above the line
(33) is greater than the number below the line (22). This corresponds to a simple sign test ($p = 0.18$). Although not statistically significant, this means that the total hospital charges for the morning report patients were lower than the total charges for the comparison patients in most cases.

**Figure 6.1** Scatter-plot of matched pairs of cases: length of stay for the morning report patients and comparison patients

[Scatter plot of length of stay](#)

**Figure 6.2** Scatter-plot of matched pairs of cases: total hospital charges for morning report patients and comparison patients

[Scatter plot of total charges](#)
There was no statistical significant difference between the two groups (the 55 matched individuals compared to the 50 unmatched individuals presented at morning report) with respect to age, number of diagnoses, gender distribution or racial distribution (all $p>0.4$). Only financial status and marital status were significantly different between these two groups ($p<0.05$).

**Discussion**

These findings emphasise the educational value of morning report in general, and the value of the collaboration between the library faculty and physicians in particular. This model is feasible, not costly (in a monetary sense) and is a valuable service to physicians seeking to improve patient care; although the approach can be ‘costly’ in terms of time spent by librarians to find the supporting literature for each case. To present the case, allot approximately two to three hours to execute the search for the pertinent literature and disseminate the search results.

While it is essential to rely on the physician’s clinical judgement when describing patient encounters and selecting articles to answer the questions posed about each case, this collaboration underscores the importance of librarians moving outside the library walls to deliver reference services to physicians who provide patient care. Also, this model clearly shows the importance of using technology to deliver information that may improve patient care.

Schwing and Coldsmith have suggested moving a step beyond this model and having librarians provide reference service in real time. They advocate searching for clinical answers and projecting the answers on to the screen either during or at the end of the morning report case discussion. The questions and answers could then be archived and accessed by house officers via the Department of Medicine’s website. These logical next steps would serve three purposes: enhancement of the house officers’ learning experience; improved access to the clinical pearls gleaned from each case presentation; and improved patient care.

A project such as this increases librarians’ visibility with physicians, encouraging them to take advantage of library services in the future and work collaboratively with the library faculty on other projects.
Furthermore, Atlas et al. have noted that participation in this type of project helps librarians gain a better understanding of users’ needs in the clinical setting.26

Conclusion

This model of collaboration takes library services to clinical departments, using reference librarians effectively in a clinical setting and affecting patient care in positive ways.27 Indeed, positive outcomes were noted by the house officers, many of whom applied the supporting literature to the management of cases presented at morning report. Furthermore, this liaison between physicians and librarians facilitated the use of resources for the purpose of reducing the LOS as well as hospital costs for those patients presented at morning report.

Exercise E

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define patient outcomes.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Explain the evolution of evidence-based librarianship from evidence-based medicine.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to evidence-based practice.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other library services that may affect patient outcomes.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research. Look at pp. 9–10 of ACGME’s Institutional Requirements for ideas.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)
References


www.ResearcherGate.ir


28. Accreditation Council for Graduate Medical Education, ref. 14 above.
Reaching out to research students: information literacy in context

Angela Newton

Setting

It is a common assumption in UK higher education that students at all levels self-develop effective strategies for finding and managing information, but student feedback suggests that they struggle to get to grips with some key skills: ‘I often worry there’s crucial papers out there I don’t know are there...’ Students new to research are plunged into a world filled with big expectations and high ambitions. Providing training related to finding, using and managing information effectively is just one way of helping those students to succeed, but it is an important one. Leeds University Library recently set out to discover the core facets of an information-literate research student and design new training to support research students in their development of these skills.

Given the number of factors affecting the information literacy skills of new research students, the Roberts’ Review, which looked into the provision of science and engineering skills, provided a vital spur to review and improve transferable skills training in UK higher education institutions by recommending that research students receive two weeks of skills training each year.¹ To help institutions identify and develop transferable skills, the principal funding body behind research in UK higher education (Research Councils UK) had already created a statement of skills training requirements, known as the Joint Skills Statement.² Information literacy skills are clearly present in this statement, but while it is broadly useful and clearly includes information literacy, the language in which this is expressed is vague and lacks the
clarity which could have been present had one of the many models of information literacy been applied.

Each of the eight skill areas identified in the Joint Skills Statement relates to a different area of competency, and information literacy is implicit within all the skills described. The section on research management, for example, includes skills relating to identifying and accessing ‘appropriate bibliographical resources, archives and other sources of relevant information’. The link to information literacy skills here is indisputable. In the section on career management, however, the link to information literacy may be less clear, though the ability to ‘present one’s skills, personal attributes and experiences through effective CVs, applications and interviews’ feeds directly from the information literacy skill of communicating information appropriately and effectively.

Table 7.1 demonstrates how the Joint Skills Statement meshes with the SCONUL Seven Pillars model of information literacy (developed in 1999 as a definition and model of information skills for higher education), which is used at Leeds University Library to inform the delivery of information literacy training skills. Subsections of the Joint Skills Statement do not explicitly refer to all the information literacy skills required by research students; Table 7.1 shows where some of the gaps in the Joint Skills Statement lie in relation to the SCONUL Seven Pillars model, with shaded sections representing areas of commonality.

**Objective**

In the light of the recommendations of the Roberts’ Review, the (incomplete) inclusion of information literacy skills within the Joint Skills Statement and the provision of funds from central government to support the implementation of Roberts’ recommendations, Leeds University Library staff set out to enhance their existing support for research students in information literacy skills through a research and development project.

While faculty team librarians responsible for liaison with individual departments at the University of Leeds have developed a strong training culture among undergraduate students, research postgraduates have been less easy to identify and train appropriately. With a range of prior educational experiences, variable support from supervisors and differing office hours on campus, the information literacy needs of research
## Table 7.1  Comparison of RCUK Joint Skills Statement with the SCONUL Seven Pillars model of information literacy

<table>
<thead>
<tr>
<th>Information literacy skills as defined in the SCONUL Seven Pillars model</th>
<th>Recognise information need</th>
<th>Distinguish ways of addressing gap</th>
<th>Construct strategies for locating</th>
<th>Locate and access</th>
<th>Compare and evaluate</th>
<th>Organise, apply and communicate</th>
<th>Synthesise and create</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research skills and techniques</td>
<td></td>
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<tr>
<td>Research environment</td>
<td></td>
<td></td>
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<tr>
<td>Research management</td>
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<tr>
<td>Personal effectiveness</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Communication skills</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Networking and teamworking</td>
<td></td>
<td></td>
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<tr>
<td>Career management</td>
<td></td>
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</tbody>
</table>
postgraduates were less well defined to faculty team librarians. Therefore, the core objective of the project was to enhance provision of information literacy training for the target group through the creation of new training materials appropriate to their needs. These materials could then be used by faculty team librarians to establish new training opportunities for research postgraduates.

Methods

Evidence was taken from several different sources to inform the creation of new information literacy training for research postgraduates. An investigation of current best practice in information literacy training for this group was necessary. It was also vital to learn how University of Leeds research students perceived their own information literacy skills and how faculty team librarians perceived training methods and priorities. All these needs were factored into the design of a pilot training session intended to equip research students with the information literacy skills fundamental to their success. Table 7.2 shows the full range of methods used to collect the evidence necessary to build an understanding of each key area and plan future training. Two major pieces of software were used to collect data from research students: Bristol Online Surveys (BOS), developed by the University of Bristol, and QuestionMark Perception.

Table 7.2 Workplan for Leeds University Library’s information literacy project

<table>
<thead>
<tr>
<th>Information required</th>
<th>Method of collecting evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>What kind of training is currently delivered by Leeds University Library to this user group, and how many students are being trained?</td>
<td>• Review of current practice in research student training by faculty team librarians</td>
</tr>
<tr>
<td>Do faculty team librarians have a vision of how research postgraduates should be trained?</td>
<td>• e-mail questionnaire of faculty team librarians</td>
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<td></td>
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<td></td>
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</tbody>
</table>
Audit of current practice

With a population of around 2,000 research students, the University of Leeds has a significant student body whose studies would be affected if they received two weeks of transferable skills training each year. Understanding the kinds of information literacy training that were already being offered and delivered to these students was a key starting point. An audit carried out by e-mail and in face-to-face discussions revealed that faculty team librarians had a variety of existing training agreements for these students with individual schools and institutes. This arrangement lacked parity of service; students in some schools received highly developed training, and others were offered at best the bare minimum of a library tour. This variety was due, in part, to the perception among some academic staff that there was no need to provide information literacy training for research students.

The audit also clearly demonstrated that there was little consensus among faculty team librarians about the kind of information literacy

<table>
<thead>
<tr>
<th>Table 7.2</th>
<th>Workplan for Leeds University Library’s information literacy project (Cont’d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>May</strong></td>
<td>What does recent research literature say about the information literacy skills and needs of research postgraduates?</td>
</tr>
<tr>
<td></td>
<td>▪ Literature review of recent research including:</td>
</tr>
<tr>
<td></td>
<td>– library user surveys</td>
</tr>
<tr>
<td></td>
<td>– national surveys/statistics</td>
</tr>
<tr>
<td><strong>June/July</strong></td>
<td>Which other university libraries are delivering best practice in information literacy training for research students?</td>
</tr>
<tr>
<td></td>
<td>▪ Review of peer institutions in the UK</td>
</tr>
<tr>
<td></td>
<td>▪ Study tour of several Australian university libraries</td>
</tr>
<tr>
<td><strong>August/September</strong></td>
<td>How do Leeds University research students view their information literacy skills?</td>
</tr>
<tr>
<td></td>
<td>▪ Research student needs analysis survey 2005</td>
</tr>
<tr>
<td></td>
<td>– BOS software</td>
</tr>
<tr>
<td><strong>October/November</strong></td>
<td>What are the real information literacy skills of incoming research students at Leeds University?</td>
</tr>
<tr>
<td></td>
<td>▪ Self-diagnostic test carried out with all students attending the new training session</td>
</tr>
<tr>
<td></td>
<td>– QuestionMark Perception software</td>
</tr>
<tr>
<td><strong>March/April 2006</strong></td>
<td>Does the new training programme meet the information literacy needs of the research students attending?</td>
</tr>
<tr>
<td></td>
<td>▪ Student feedback</td>
</tr>
<tr>
<td></td>
<td>– feedback form (immediate)</td>
</tr>
<tr>
<td></td>
<td>▪ Faculty team librarian feedback</td>
</tr>
<tr>
<td></td>
<td>– e-mail questionnaire</td>
</tr>
</tbody>
</table>
skills that needed to be taught at this level of study. Discussions suggested that an ‘anything and everything’ approach was more common than an evidence-based curriculum. It was also common for faculty team librarians to train MA and PhD students together in the same subject groupings: ‘PhD students are invited to group training for MA students, but I’ve no idea which students are which.’

Librarians expressed several concerns about the kind of training currently being delivered, not least of which was the fact that they had little or no prior awareness of the specific subjects being researched by the students attending their training. When asked the kind of training they thought would be useful to research postgraduates, faculty team librarians expressed broadly similar ideas: ‘A seminar where their current practice can be discussed, what methods they use to find information, what sort of information they think they will need during their research and where they think they’ll find it.’

Librarians were also keen to point out that while they would welcome consensus on the core facets of an information-literate research student, the resulting training should not be entirely generic in format. Flexibility was felt to be essential to delivering guidance of real relevance, as was the notion of face-to-face interaction rather than online delivery.

Leeds University Library runs a popular series of bookable training sessions aimed at staff and students wishing to upgrade their skills in different aspects of information literacy. Research postgraduates have always made up a substantial proportion of attendees (40 per cent in 2004/2005), and clearly this group perceives a need to attend training in certain areas. The best-attended session in 2004/2005 was ‘EndNote (starter session)’. ‘Dissertations and theses: how to find them’ was much less popular in spite of the fact that the 2005 research student needs analysis (RSNA) survey carried out at the University of Leeds demonstrated that around 60 per cent (391) of research postgraduates surveyed did not know how to find theses written at other institutions.

It was surmised that the new training should recommend sessions from the existing bookable library training programme to avoid unnecessary duplication of resources, take advantage of the range of training sessions already on offer and more clearly advertise this to students.

**Literature review**

An analysis of the published literature helped to give insights into the wider context of information literacy training for research
postgraduates. The road to becoming a PhD student can encompass a variety of educational experiences in a range of geographical locations. More and more research students are choosing to conduct their studies in Europe, and a growing number of international students are studying at the University of Leeds. In 2005/2006 27.9 per cent of University of Leeds research students were non-EU residents.

Constructivist theories of learning say that students’ prior educational experience often directly affects their learning behaviour, and many overseas students may therefore be challenged by an unfamiliar research environment that is reliant on complex electronic resources. International students at all levels of study are also more likely than UK students to enrol in study skills courses, demonstrating a heightened awareness of a potential skills gap.6

While some international students may have good self-awareness of the skills they lack, the general picture is less encouraging. A 2003 study undertaken at Australian National University found that when asked to assess their information-seeking skills the majority of incoming PhD and MPhil students overestimated their abilities.7 The Australian National University concluded that these students were unlikely to seek out training opportunities, a worrying prospect when some of those surveyed who felt their skills were good were in fact ‘seriously in need of additional training if they were going to be able to search for information effectively’.8 Evidence from the report showed some clear knowledge gaps. For example, well over half the students surveyed thought that a typical search engine would search all online information.

Unconscious incompetence of this kind is not unknown in the literature. Kruger and Dunning made a detailed study of this phenomenon in their 1999 paper, ‘Unskilled and unaware of it’, and found in many cases that ‘those who performed particularly poorly relative to their peers were utterly unaware of this fact’.9 The question of how to raise awareness in research students of aspects of their own incompetence, while providing positive motivation, was an important one to consider as part of the entire project.

Attitudes and behaviours towards training exhibited by PhD supervisors are useful indicators of the climate in which research students work. Evidence suggests that supervisors assume a level of information literacy skill from their research students which may not be justifiable.10 Furthermore, a 2002 survey revealed that there is a general ‘perception amongst researchers that training was not required. The survey showed that over half of all researchers either do not take up training or advice when it is offered or are unaware that it is available.'11
Issues that researchers did want to be trained in were ‘specialist on-line search skills and ways of keeping up-to-date’. This may prove disadvantageous for research students actively seeking training in information literacy. When supervisors are either unaware or dismissive of available training, how can research students be adequately advised on the best course of action? The same survey also found that postgraduate students were much more at home with using electronic information resources than established researchers, leading to the conclusion that they have already formed their own patterns of information-seeking rather than absorbing those of their supervisors.

Methods of collecting information vary between subject disciplines, and research by Sheila Webber and Bill Johnston, among others, can give valuable insights into how information literacy is perceived and operates in different subject areas.

In the arts and humanities, browsing as a means of resource discovery is important to researchers. It appears that little has changed in information retrieval techniques for these subjects for 20 years, since a 1981 study also found that arts and humanities researchers employed similarly unsystematic information retrieval methods. The dominance of printed information in the arts is confirmed by a study by Ellis and Oldman, who found that e-journals are perceived as low-value publications for UK English literature departments. Researchers responding to this survey were sceptical about the value of information found using the internet: ‘the origin of certain documents is uncertain and... it is hard to evaluate the document in terms of its research potential’. Online databases, abstracting services and library catalogues were, however, very popular with this group.

Business and marketing researchers value current awareness and keeping abreast of the latest news and developments is a priority. In medicine, health and psychology effective literature searching is vital, and getting an overview of reliable literature in a specific field is critical to patient care.

In contrast to these more traditional library users, the GAELS project (Glasgow Allied Electronically with Strathclyde) investigating collaborative library services for engineers between two university libraries found that engineering researchers were less likely than other groups to use traditional library services, and showed strong preferences for using electronic information. This may mean that engineering researchers are less likely to visit libraries than researchers in other subject areas, and less likely to seek help from library staff or attend information literacy training.
A recent study by Christine Bruce and colleagues suggests that information technology (IT) research students have a narrower view of their subject area than academic staff: 'students seem to be looking to differentiate IT from other disciplines whereas academics seem more aware of collaborative opportunities'.22 The subjects of Bruce et al.’s research were new students, who were found to be less aware of the interdisciplinary nature of their research than their academic colleagues. In information literacy terms, this means that new research students may be less aware of the need to cross-search different subject areas for information.

Although the information literacy skills required by research students vary among disciplines, a list of core information literacy competencies is a useful benchmark. The Big Blue Connect project which investigated the information skills of staff in UK higher and further education institutions identified the essential skill competencies and three core activities that researchers should be able to carry out, all of which are compatible with the skills required by Research Councils UK in their Joint Skills Statement and are pertinent to planning information literacy training for research students.23 The competencies and activities generated by the Big Blue Connect project, along with information gathered in the rest of the literature review, helped to shape both the content of the pilot training and the construction of a self-diagnostic quiz filled in by students prior to receiving this training.

Research student needs analysis survey 2005

The university-wide RSNA survey at the University of Leeds included questions on a range of university support services and educational experiences. Students from any year of research postgraduate study were asked to respond, with the vast majority of respondents indicating they were undertaking a PhD. The response rate of 30.5 per cent represented 652 respondents out of a total estimated population of 2,135.

The survey was conducted using BOS software and advertised via e-mail. Students without access to a computer or e-mail would therefore have been unable to participate in the survey, though it is estimated that the number of people implicated was small.

Survey questions about information literacy were intended to gather self-perceptions of student abilities in essential information literacy skill areas (as identified in the literature review). The final question included
a free response box, and it was hoped that the questions leading up to this would stimulate useful comments from students on relevant issues. A full list of the information literacy questions asked in the survey can be found in Table 7.3.

The first group of questions required students to select from four response choices: needs a great deal of attention; needs attention; satisfactory; excellent. These response choices fit a pattern established in preceding questions in the survey. The ‘satisfactory’ option was the most often selected answer in all but one of the questions asked about information literacy. Questions in other areas of the survey were also affected by this. ‘Satisfactory’ is a word with varying connotations and may have been selected by students for different reasons.

Answers given by students revealed that their levels of confidence in specific information literacy skills were mixed (see Figure 7.1). When
asked about their use of bibliographic reference management software, for example, over 42 per cent (274) of respondents said their abilities in this area were less than satisfactory.

Two other areas in which significant proportions of respondents felt less confident were current awareness and obtaining theses (see Figure 7.2). When asked whether they knew how to find and obtain theses written by students from other universities, 57.8 per cent (377) of respondents said that this skill ’needs attention’ or ’needs a great deal of attention’, demonstrating a clear gap in the knowledge of research students with regard to a skill necessary to conducting a literature review.
Higher levels of confidence were shown by respondents in answer to questions about evaluating web-based information, Boolean terms, using advanced features of search engines and databases and plagiarism. The two questions on web-based information, for example, received some of the lowest scores for ‘Needs a great deal of attention’ in this section of the survey, indicating that respondents felt very comfortable using the technology. The area in which respondents showed the greatest confidence was in relation to plagiarism. More than 90 per cent (587) of research students self-assessed their ability as ‘satisfactory’ or ‘excellent’.

A second set of questions on information literacy in the survey asked research students to ‘strongly agree’, ‘agree’, ‘disagree’ or ‘strongly disagree’ with a number of statements designed to find out more about their attitudes towards particular aspects of information literacy.

The statement ‘I am worried that I sometimes miss essential papers when literature searching’ generated a wide spread of opinion, with more than half of respondents agreeing or strongly agreeing that this was a concern for them. This highlights a possible contradiction with the answers given to the question ‘I plan my literature searches when preparing a literature review’, to which 75 per cent (489) of respondents said that they performed either satisfactorily or excellently; if research students plan their literature searches and follow these plans through, then their fears over missing essential papers should be minimised.

The level of anxiety expressed over missing essential papers is also at odds with the high confidence expressed when students responded to the final statement in this questionnaire on information literacy, ‘I feel confident in searching for information and managing the information I find for my research’. The free response box gave students an opportunity to comment on fears about missing essential papers in literature searches: ‘I often worry there’s crucial papers out there I don’t know are there...’ and ‘This could be connected to the fact that little research was done on my subject, but I am also suspicious that I am unable to find any recent literature on the subject.’

There was also a mixed response by students to the statement ‘I find it difficult to keep track of what I have read’; while over half of all respondents disagreed or strongly disagreed with this, a significant proportion agreed. Comments made by respondents later in the survey shed light on why this might be:

I can find the relevant papers and read through them but am unsure how to organise and summarise the contents.
I am able to to a certain extent to search for material for my research but usually find it very difficult managing information in terms of linking authors to issues raised when writing; this is particularly in relation to question 31 above in terms of difficulty keeping track of what I have read.

This statement clearly gave some respondents food for thought given the reflective comments which were received, of which these are typical.

Students showed confidence in their overall abilities to search for and manage information for their research and find the information required quickly. When responding to the statement ‘I usually find what I’m looking for quickly’, almost 70 per cent (456) said they agreed or strongly agreed; 30.5 per cent (199) of respondents disagreed or strongly disagreed, however, demonstrating that not all research students have a uniform experience of searching for information. While this statement is not detailed enough to gauge real-life experience, comments received in the free response box indicate how some students locate information: ‘I tend to rely on consulting paper bibliographies in backs of books and papers and building lists in Word of things to read/or have read. It works for me.’

The final statement, ‘I feel confident in searching for information and managing the information I find for my research’, gave students an opportunity to summarise their feelings (see Figure 7.3). A majority of students agreed with the statement. It was anticipated that this question would generate a much higher percentage of ‘strongly agree’ responses, though in fact the number of ‘disagree’ responses is higher.

![Figure 7.3](www.ResearcherGate.ir)
Students who answered ‘disagree’ or ‘strongly disagree’ to this statement were invited to write about this. These comments illustrate that students have variable information literacy skills, and may be more skilled or confident in some areas than in others:

I know that some of the answers given might contradict, it is just I am good in finding information, still sometimes I come across important things of which I think I should have read them earlier and than wonder on how many things I might miss out. I am not good in writing down right away what I have read and then forget about it again.

Another comment reveals that electronic information can be less easy to manage than a simple ring-binder: ‘I find it difficult to find the right PDF file that I have saved on my own computer and am not sure how best to organise them.’ Reference management software can be used to deal with large volumes of electronic information, and reference visualisation software can also benefit research students seeking an overview of the literature obtained. It might be concluded that respondents perceived a greater problem managing information than finding it. Anxieties about how to organise information to develop an overview of the literature, key debates, themes, etc. were also expressed. The research process at the postgraduate level produces larger amounts of information than most students will previously have handled, and this will be gathered and stored in a variety of formats. Without developing a systematic approach to handling the information retrieved, writing a literature review may be difficult.

Many written comments indicated that students had had no training in literature searching during their university education, and were effectively self-taught. A number of students expressed a clear desire for training in information literacy skills:

I think a session on using online databases would have been useful for everyone on my course and should be incorporated into the teaching.

As far as I am aware no such course exists and it is a major skill for a research student to develop.

The results of the RSNA survey suggest that research students possess differing levels of skill and confidence in information literacy, and it is only through recognition of this in training that variations among
individuals can become less pronounced and students can fully exploit the great wealth of information available to them.

**Self-diagnostic quiz**

Faculty team librarians identified that having little or no prior warning of the research topics or information literacy abilities of research students attending training was a significant problem. A self-diagnostic quiz, designed to capture information about information literacy abilities, was therefore developed for students to use prior to their attendance at one of the five pilot training sessions. The quiz results, though of a vastly smaller and slightly different population group (36 new research students at the beginning of their PhD), were also useful as a contrast to the results of the RSNA survey, which obtained information about self-perception of ability in information literacy.

The quiz was delivered via QuestionMark Perception software, and enabled students to see on-screen feedback on their performance in several key areas (as identified in a literature review, the RSNA survey and examples of good practice in research student information literacy training at other universities): current awareness; searching for and obtaining theses; bibliographic reference management software; plagiarism; web searching and evaluation; Boolean terms; and cited reference searching. In addition, students were asked to give the title and subject of their PhD.

Students showed a good level of understanding in the area of web searching and evaluation, with many thoughtful responses to a question asking them to describe how they would evaluate web-based information:

Check about organisation/author/web maintenance information and background. Check about other previous reports, newsletters etc. I may have already used the website in the past.

A minority of students were unsure about how they would do this: ‘I have no idea, sorry.’ Only 17.9 per cent (117) of students responding to the RSNA survey felt that they needed to improve their skills in using Boolean terms. The results of the self-diagnostic quiz, however, indicate that 24.2 per cent (158) were unable to identify correctly how AND, OR and NOT should be used, indicating a need for further guidance for new research students in this area.
The very high levels of confidence expressed by research students responding to the RSNA survey on the subject of plagiarism were borne out by the results of the quiz: 88.5 per cent (577) of survey respondents said that they had ‘satisfactory’ or ‘excellent’ skills in understanding plagiarism; students using the self-diagnostic quiz achieved a mean correct score of 85.4 per cent. One question which confused a minority of students, however, was whether or not they needed to ask permission from the author to cite their work.

Over 42 per cent (274) of RSNA survey respondents felt that they needed to improve their skills in using bibliographic reference management software such as EndNote. The self-diagnostic quiz showed that 72.1 per cent of these new research students had never used reference management software, and just one of those who had felt ‘very confident’ about their ability to do so. This represents a significant training need for new research postgraduates which supervisors and information literacy practitioners should be aware of and take action on.

The picture of research student confidence and ability in keeping up to date with new publications is complex. While nearly 70 per cent (456) of RSNA survey respondents said that their ability in this skill was ‘satisfactory’ or ‘excellent’, students using the self-diagnostic quiz were less clear about what their actual strategies were. Almost 28 per cent of students failed to complete this section of the quiz. Of those who did complete it only 11.1 per cent said that they received regular e-mail alerts from bibliographic databases. One respondent commented: ‘I have not yet reached the stage of being up to the current day with my literature review. As I get closer e-mail alerts will be used although at present I only use manual searches.’

Current awareness represents an obvious information literacy skill in which new research students need help and guidance in establishing a regular working strategy.

Searching for and obtaining theses was another skill identified in the results of the RSNA survey where research students needed extra assistance, and this was confirmed by the decisive results in this section of the self-diagnostic quiz, where more than 72 per cent of students filling in the quiz declared themselves unable to search for and obtain theses.

All of the results from the quiz were used by faculty team librarians to inform them of the information literacy needs of their group of students. In some cases this led to a reshaping of the structure of the subsequent training session in order to meet the needs of attendees more fully.
Study tour

A study tour of four Australian universities (Australian National University, Queensland University of Technology, University of Queensland and Griffith University) with well-developed information literacy training for postgraduates took place in November and December 2005. The intention of the tour was to share new ideas, understand how information literacy training for research postgraduates has evolved and where it is going in the future and discover what kind of learning and teaching tools were being used elsewhere. All this evidence was used to reflect on how training could be developed at the University of Leeds.

Training provided by the Australian universities visited covered broadly similar topics to the workshop piloted at the University of Leeds: vital information literacy skills for research such as cited reference searching and systematic literature searching appear regularly in course overviews. New ideas for training aids such as current awareness resource diaries were discovered, and may be considered for possible use in University of Leeds training in future years. Ideas for assessing the information literacy skills of postgraduates were also highlighted on this study tour, and although there is no scope for introducing assessment at the University of Leeds at the present time, such ideas are helpful to inform future thinking if such an opportunity should arise.

The study tour also exposed the links between employability, lifelong learning and information literacy; given that 52.3 per cent of UK PhD students in 2004 did not go on to enter a career in education, it is important that their information literacy skills do not just equip them for their research, but also for a career in industries such as finance, health and manufacturing. While information literacy is essential for research, employers also require information-literate employees, and as the EU moves towards a knowledge economy those who are equipped to undertake effective research in the workplace will thrive.

Conclusion

Creating a new information literacy workshop for research postgraduates at the University of Leeds has necessitated an examination of a number of different information sources, and the creation of new learning and teaching tools and training materials. A new pilot training
session incorporating good practice and evidence from the activities described in this chapter was piloted with four faculties in 2005/2006. Table 7.4 shows the structure and content of the workshop and the other recommended sessions from the bookable series of training sessions run by Leeds University Library.

Student and trainer feedback from the pilot sessions has been very positive, with trainers suggesting useful improvements to the session and reflecting on student learning:

![Table 7.4 Leeds University Library research student training: content and structure of pilot training](www.ResearcherGate.ir)
The mind map exercise was good. I felt that they got the idea but needed prompting as we went around to consider variants of words, so obviously this exercise was needed! Going round and looking at the different mind maps was very revealing and you could tell how some people were suited to that way of thinking whereas others were grid-and-list people through and through.

Finding out whether the new training satisfied student needs was important for the review of the pilot session and the rollout of the training to all faculty team librarians in 2006/2007. Over 95 per cent of workshop attendees said that the training ‘completely’ or ‘mostly’ met their expectations and no students said it had not met any of their expectations. In their feedback, students said the most useful section of the workshop was ‘Literature searching for your PhD’ and the least useful was ‘Managing information for research’. A number of changes to the delivery mechanisms of the workshop will be made as a result of this and trainer feedback to make the training materials more self-directed and discovery-based.

Written student comments also indicate how the workshop proved to be of value to them:

Very helpful session – even though been in PhD for 6 months, very helpful overview plus new hints to improve ability. Thank you.

It was cool! I feel much happier about starting my PhD.

It was great! Easy to follow pace and straightforward. Maybe we could have more time to spend on practice on our topic.

The evidence gathered from the results of the literature review, RSNA survey, examination of good practice and the self-diagnostic quiz demonstrates the value of consulting a variety of information sources and considering in detail the practical application of the resulting knowledge. Discovering more about the anxieties of research students in relation to information literacy skills was particularly insightful as evidence helped shape new training materials for research postgraduates and assisted faculty team librarians in understanding more about this group of students and how to address their concerns.

Research students should be offered a variety of training opportunities in the practical skills they need to be information-literate. Given the range of skills and abilities seen in the research students contributing to

www.ResearcherGate.ir
this project, self-diagnostic testing seems a good way for information literacy practitioners to enhance their training and create flexibility of approaches. Where the information literacy of research students is concerned, one size clearly does not fit all, and finding new ways of responding to that challenge is critical.

Exercise F

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Define information literacy.</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Compare information literacy efforts as described in Chapters 2, 3 and 7.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to using a Likert scale for needs assessment.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other library services that may benefit from a similar approach.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
</tbody>
</table>

Source: Adapted from Connor (2006)

References

3. Ibid.
4. Ibid.


8. Ibid.


12. Ibid.

13. Ibid.


15. SIRU, ref. 11 above.


www.ResearcherGate.ir
18. Ibid.
25. Ibid.
The Cal Poly digital learning initiative

Mary M. Somerville, Erika Rogers, Anita Mirijamdotter and Helen Partridge

Setting

Amid rapid technological change, aggravating financial uncertainty and escalating community expectations, librarians at California Polytechnic State University in San Luis Obispo recognised that nimble responsiveness required reinvention of library processes, procedures and services. They understood that this would require changing how they think and what they think about as they readied themselves for new roles in the academic enterprise.

Concurrently, librarians in this comprehensive polytechnic teaching university observed a consistent pattern of declining gate counts and diminishing reference transactions, despite student enrolment increases to 18,500 in academic year 2005/2006. These data suggested that even the traditional ‘library as place’ role was eroding at this institution, which offers a wide range of baccalaureate and master’s degree programmes. Librarians were not alone in recognising that the library was increasingly marginalised on campus: when campus administrators announced permanent budget cuts, the library’s share was consistently greater than other academic support units.

So when a new group leader was hired in September 2003, public services librarians agreed to examine the underlying assumptions and beliefs that historically guided research, information and instruction delivery decisions. They also chose to use systems thinking tools to build larger frames of reference capable of bridging boundaries within the library and across the campus. These choices affirmed that ‘no matter what the previous history, every system can be altered and reinvented’,¹ suggesting that ‘if organizations are constructed, they can be reconstructed’.²
Since both individual and collective change begin with the onset of research, librarians recognised that the question of what to study was critically important. As this case study illustrates, it has proven equally important to consider the question of how – and with whom – to conduct evidence-generating research projects to enable organisational learning.

The university’s distinguishing student-centric ‘learn by doing’ educational philosophy also informed selection of their professional research-in-practice approach. It drove librarians’ agreement to invite student-generated research projects on library services and systems, with the aim of obtaining authentic perspectives on ‘user experience’ expectations, preferences, wants and needs. This approach required relinquishing control of the research process: students, with faculty supervision, generated problem definitions, chose research methodologies, conducted data analysis and produced results reports.

Progressive student research reports offered opportunities for librarians to engage with student and faculty researchers to ascertain the implications of findings for library services and systems. Iterative dialogue fostered sustainable communication which altered relationships, processes and practices. Through the application of collaborative evidence-based information practice (EBIP), the Cal Poly library moved from a service to a learning culture. This chapter describes Cal Poly’s collaborative EBIP approach and illustrates key application projects.

Objectives

With a pragmatic perspective from working experiences in librarianship, evidence-based information practice utilises the best available evidence to improve library practice. According to Booth and Brice, EBIP has several defining characteristics. These include:

- context of day-to-day decision-making;
- an emphasis on improving the quality of professional practice;
- a pragmatic focus on the best available evidence;
- incorporation of the user perspective;
- acceptance of a broad range of quantitative and qualitative designs;
- access, either first-hand or second-hand, to the (process of) evidence-based practice and its products.
With firm grounding in these principles and practices, this chapter reports on a modified version of EBIP – collaborative EBIP – which is used successfully at the Cal Poly library. A defining characteristic of this approach is that the evidence-based processes are driven not by librarians but rather by stakeholders who assume responsibility for problem definition, methodological implementation and data analysis activities. Reliance on student-framed, student-conducted and student-reported research results serves to shift the locus of decision-making control from ‘library-centric’ to ‘user-centric’.

This innovative, evidence-generating approach was paired with an action research orientation that aims to bring about change in the project situation (the action) while learning from the process of deriving the change (the research). In this case the emphasis on enquiry-based learning, as well as attention to participation and involvement, simultaneously advanced participants’ practical problem-solving and enriched their professional competencies. Systems thinking was used to guide librarians’ reconsideration of fundamental notions about organisational purposes, concurrent with reinventing constituency relationships and workplace roles. Thinking tools also fostered ‘big-picture’ appreciation of the larger academic enterprise.

**Methods**

In the technology industry, designers are discovering that their products are often much more successful when they take into account the needs, expectations and behaviours of their target audience (the ‘users’ of the technology products) as opposed to relying on their own (in-house) opinions and expertise. The creation of effective ‘user interfaces’ (the means by which end users communicate with technology or technology systems) requires careful consideration of the context of usage (i.e. how do people work, how do people solve problems, how will the technology be incorporated into work practices, how do people interpret the technology’s output and what are their strengths and weaknesses?). There is a recognised need for mediation between the world(s) of the end users and the world of technology in order to bring the two together in an ultimately productive relationship.

In the world of contemporary librarianship, one could say that there is an analogous need for mediation between the worlds of the end users (in this case faculty and students) and the technology-based world of
digital information. From this perspective, the main interface issues are not between humans and software/hardware systems in order to do work (although these sometimes do affect the outcomes), but rather between humans and information systems in order to make meaning. In this view, the new role of librarians can be seen as facilitating the ‘input’ mechanisms (e.g. how to query the information space/system in the context of a problem) and the ‘output’ mechanisms (i.e. how to make sense of what the information system is communicating back).

User-centred approach

In reconceptualising their roles, Cal Poly librarians discovered the field of human-information interaction. This relatively new arena draws heavily on the methodologies and techniques developed in the study of human-computer interaction (HCI). More specifically, in 1995 Dr Nahum Gershon coined the term ‘human-information interaction’ (HII) to denote how human beings interact with, relate to and process information regardless of the medium connecting the two. Since then the term has been widely adopted by the traditional information science and retrieval communities to characterise highly interactive interfaces and user-centred methods that reflect sensitivity to the dynamic, multi-channel nature of information-seeking behaviour. Researchers in HII draw insight and inspiration from the field of HCI while recognising their distinctively different – though highly complementary – research interests.

The approach known as ‘user-centred design’ is both a philosophy and a process in which the needs, wants and limitations of end users play a central role at each stage of the design process. Related methodologies include cooperative design, the Scandinavian tradition that involves designer and user co-design; participatory design, a North American version of the above; and contextual design, a method that approaches product design directly from an understanding of how customers work. While quantitative methods are sometimes included in these approaches, a key feature of all of these design methodologies is the integral and extensive use of qualitative data/evidence collection and analysis – interviews, focus groups, ethnographic studies and user observation. Another important characteristic is the emphasis on iterative design, often leading to rapid prototyping of solutions which can, in turn, be evaluated, modified and, finally, implemented in a relatively short time-frame while incorporating user feedback throughout.
Admittedly, this iterative, qualitative approach to EBIP departs from the more standard reliance on quantitative research methodologies. However, given Cal Poly’s action research orientation, which pairs individual and team learning with ‘real-world’ situation improvements, predominantly qualitative, user-centric HCI and HII methodologies offered a number of important benefits. For instance, successful implementation of recommendations required ongoing face-to-face and technology-enabled communication between librarians and student researchers throughout the data collection and interpretation phases. These dialogues offered librarians valuable ‘voiced’ insights into user constituency perspectives. The exchanges also offered opportunities for clarification and aided interpretation, unlike ‘cut-and-dried’ numeric data.

This user-generated approach to information practice enabled the gathering of a rich array of textured evidence that allowed quick prototype problem solutions, service improvements and organisational changes. Its iterative nature encouraged continuous improvement. In addition, because relationships with supervising faculty often continued, it was possible to re-examine different aspects of a particularly perplexing problem in subsequent quarters. This served to develop sustainable partnership relationships between the library and the campus community.

Projects

Example 1 – Systems thinking

Cal Poly librarians were readied for rethinking through soft systems methodology (SSM)\(^\text{10}\) practice. Developed by Dr Peter Checkland at the Lancaster University Management School in the UK, this qualitative and interpretivistic research approach was introduced by Dr Anita Mirijamdotter, the head of social informatics research at Luleå University of Technology in Sweden. SSM was selected because it seeks to consider simultaneously multiple stakeholders’ perspectives (in this case, students and faculty) even as it brings to the surface the tacit operating assumptions of organisational ‘owners and actors’ (in this case, librarians) with a view to renegotiating the purpose(s) of systems and services. Data-rich and learning-intensive, this approach aligned well with librarians’ reconsideration of their traditional roles in the academic enterprise.

The SSM process permits – and in fact encourages – inclusion of a wide range of data sources, including lesser-known qualitative research
methodologies. So in January 2004 graduate student Clarence Maybee initiated a richly textured data collection project which explored undergraduate Cal Poly students’ conceptions of information and information use. Supervised by Dr Mary M. Somerville, assistant dean for the library’s information, instruction and research services, Maybee conducted open-ended interviews of undergraduate students in most polytechnic disciplines.

Maybee used phenomenography, a research approach developed in the 1970s by Swedish educational researchers who sought to reveal forms of thought in terms of how people interpret aspects of reality. Unlike the cognitive approaches to user studies often utilised in the library and information science field, phenomenography supports the non-dualistic view that experience is a relationship between a person and a phenomenon. Both the research tenets and the research results informed librarians’ evolving appreciation of the critical relationship between information and learning. For instance, they came to realise that students desire to ‘find and use’ rather than ‘search’ as librarians are prone to do. In addition, they were convinced that understanding students’ perspectives is essential to advancing their learning. This research also predicted an important future insight: that learning occurs during information encounters which change existing conceptions.

In a complementary research effort to gain a fuller appreciation for faculty perspectives, librarians collected college strategic plans, departmental curriculum plans, accreditation standards, external programme reviews and course syllabi. These documents furthered understanding of faculty viewpoints and requirements, which were supplemented by insights gained during formal and informal one-on-one and group conversations, and enabled comprehensive evaluation of the entire collection – which had never been evaluated (nor deselected) in its 100-year history – and revision of the monograph approval plan profiles, which were last updated in 1989.

Integration of insights from exploration of faculty and student perspectives involved librarians in visualisation exercises using simple SSM renderings. This research phase was intended to identify elements necessary to build campus partnerships sufficiently robust to produce substantial integration of information resources and information literacy into campus teaching and learning activities. In harvesting insights from the data, librarians asked ‘what do faculty and students know?’ ‘what do they need to know?’ and ‘how can we assist them?’ Examples of the
‘rich pictures’ generated by librarians during this synthesis experience are shown in Figures 8.1, 8.2 and 8.3.

Figure 8.1 acknowledges the considerable information fluency possessed by entering college freshmen who must, upon entry to the university, acquire an expanded set of ‘higher-education-appropriate’ information capabilities. Figure 8.2 recognises the diversity among faculty curriculum development approaches – ranging from ‘couch potatoes’ who build their courses from information ‘within easy reach’ of the couch to instructors strongly committed to identification and integration of information resources which advance students’ disciplinary competence and, concurrently, their information literacy. Comparison of Figures 8.1 and 8.2 yielded the content of Figure 8.3, which suggests the ‘value-added’ dimensions of library outreach efforts to faculty interested in resolving student ‘gaps’ through co-creation of
‘learning collections’, curriculum integration of information resources and one-on-one consultation through ‘house calls’ by ‘laptop librarians’.

This discovery process encouraged librarians to move beyond the constraints imposed by years (in some cases more than three decades) of ‘sitting at the reference desk’ and pointing at bibliographic finding tools but not entering substantively into the teaching and learning processes. In sharp contrast, sustained dialogue has produced improved assignments with explicit learning outcomes fortified by measurable assessment metrics.
These early research experiences readied librarians for subsequent learning from student researchers. Their first-hand experiences proved that learning is fostered by evidence-rich conversations which enable creation of the actionable ‘intersubjective meaning’ which fortifies relationships and builds teams. This insight proved transferable to subsequently extending the scope of the ‘listening conversations’ to include student and faculty ‘learning partners’. Finally, the action research orientation ensured that improvements in the problem situation would occur throughout the collaborative co-learning activities.
Example 2 – ExLibris MetaLib and SFX project

When results from an Association of Research Libraries (ARL) LibQUAL+ study corroborated undergraduate students’ propensity for internet Google searches, librarians recruited student researchers to assess a federated search engine, ExLibris MetaLib, and a citation linker, SFX, in hopes of offering students a ‘Google-like’ alternative. The students’ research question was: ‘How can we improve the “out-of-the-box” interface to an electronic meta-database retrieval system providing federated search engine access to the library’s expensive online databases of scholarly journals, newspapers and other research resources?’

Computer science professor Dr Erika Rogers directed the work of students in a senior-level HCI course. Students identified three main foci of concern: to propose a design for an interface that would be functionally usable and efficient for the students and faculty of Cal Poly; to design overall branding for the site so users would be able to distinguish library content easily; and to propose a general colour scheme and some ideas for possible graphics for the logo as well as the various ‘widgets’.

The initial part of the project included four stages of data collection and review: analysis of earlier (under-analysed) focus group results; comparison of the library’s single and federated database interfaces; generation of a list of desired specifications; and creation and testing of iterative prototypes. The students’ work was initially aided by usability test results conducted (but never really analysed) by library staff. Students supplemented these findings with two student focus groups on the standard ‘out-of-the-box’ version of an early MetaLib release. Rudimentary analysis of these data corroborated the LibQUAL+ findings that users wanted a simple, Google-like interface whenever possible.

Building on these findings in the second stage, the student team compared single database search engine interfaces with the MetaLib multi-database search interface. This analysis resulted in a proposed list of changes. The students also conducted a walk-through of four task scenarios with a small number of recruited participants. Subjects attempted to complete tasks using both the original MetaLib interface and the (proposed) customised interface product. This research effort supported earlier findings about user preferences and also identified additional problems.

Drawing insights from these results, the student team next developed an evolutionary series of prototypes, ranging from chalkboard mock-ups.
to high-fidelity final products. These prototypes addressed all facets of the MetaLib product interface including screen designs, navigation tabs, icons, logos and buttons. Student work was submitted as evidence for librarians’ consideration throughout the quarter. One proposed interface is shown in Figure 8.4.

Named PolyDog to complement playfully the name of the library’s PolyCat online public access catalogue (OPAC), the overall findings and results from this project were submitted to the librarians in the form of a final project report. Librarians considered the results so useful that, after the digital services staff implemented the students’ recommendations in a local release, they forwarded the students’ report to the product vendor, ExLibris. Many of the students’ recommendations were subsequently reflected in the new version 3 release of MetaLib. This collaborative EBIP experience also served to introduce librarians to interface design, moving them from their traditional passive stance as consumers of commercial database products.

**Example 3 – Librarians on the web**

A third project begun in January 2004 also involved students in a senior-level HCI course on user-centred content architecture design. Students started by asking ‘what do Cal Poly faculty and students know about
library resources?’, ‘what do they want to know?’ and ‘how do they want to learn it?’ Student researchers designed and implemented ‘paper-and-pencil’ surveys of faculty and students. They supplemented these findings with data derived from a librarians’ focus group. Results revealed that the overwhelming majority of both faculty and students studied were unfamiliar with librarians and their work.

In addition, when students were asked where they went to do research, 72 per cent replied that they used the internet while only 4 per cent said they went to the library. The study found that most student users employ the library website as a tool to find document resources such as books and journals, but they knew little or nothing about the library’s human resources. This is in keeping with national findings that students often do not see libraries and library personnel as part of their information-support network, relying instead upon the internet and their friends for assistance.15,16

Given student respondents’ strong web orientation, student researchers recommended that librarians produce digital research products to be refined by usability study results and interaction design techniques. While librarians began to collect and organise their content, drawing from insights gleaned from their earlier interviews with faculty which informed subsequent curriculum-driven collection evaluation and development, students initiated evidence-generating activities with the aim of exploring web-based form and content prototype design questions. When they polled students and faculty they discovered that both constituencies designated class project assistance, including database listings, as a top priority.

Two students continued the research during the spring quarter as their shared senior project. They took the work to the next level by focusing on the creation of a content architecture, including mapping of information elements to webpage components. Students combined Cal Poly evidence with ‘good practices’ identified in an international review of library webpages. They also explored the efficacy of applying Bloom’s taxonomy of learning to the outline of the content.17 For instance, they reasoned, since students have varying research skills, perhaps information resources could be described by one or more keywords from Bloom’s levels (knowledge, comprehension, application, analysis, synthesis and evaluation). This, they thought, might help students to categorise and narrow a search. The resources could then be organised in a manner that would encourage comparisons between multiple sources to help attain the ‘evaluation’ level of Bloom’s theory. The combination of these ideas resulted in the framework that, over the
summer of 2004, informed development of several prototype subject pages. These development activities offered ‘real-world’ advantages to web information seekers and also encouraged librarians’ growing awareness about what the students liked and disliked, thereby furthering their receptivity to student input as the pages continued to evolve.

During autumn 2004 a usability study was designed and conducted with a view to obtaining student feedback on the most recent disciplinary webpages. The original intention was merely to gain basic usability data to assist the library staff in finalising the pages and perhaps making some minor improvements in navigation and layout. However, the study began with a questionnaire that probed student research habits, research skills and learning styles. Following this, subjects completed a usability study of the current webpages.

The evidence resulting from the questionnaire prompted student interest in a new line of enquiry: the potential effects of learning styles, whether the concept of ‘scaffolding’ could be effectively incorporated into the website redesign and the use of ‘personas’ as an interaction design technique to model archetypal end users. A two-dimensional meta-architecture emerged for a disciplinary research portal. Constitutive elements include the following.

- **Resource usage.** There was a pattern of resource usage across and within the colleges showing that first- and fourth-year students used a wide variety of resources while second- and third-year students relied on a small number of resources.

- **Learning styles.** Over half the participants showed a strong kinesthetic learning style, suggesting that students preferred action and experimentation. Many students expressed multimodal learning styles, which supported the idea of having more than one presentation modality.

- **Web resource usability.** Students suggested providing viewing choices, such as an advanced/major version and an introductory/non-major view. They recommended adding information on senior projects, leading journals, librarian contacts, disciplinary databases and 24/7 virtual reference, as well as links to research organisations and industry contacts. Students proposed linking subject specialists’ resource pages to the Cal Poly portal, career services, university union and college advising centres, as well as providing easy access from the library homepage.
The results of data analysis, together with information about the Cal Poly curriculum, led the student researchers to propose six ‘ personas’ that represented a range of student capabilities. The goals and motivations of these personas reflected the two dimensions of the content architecture – the temporal/curricular dimension of academic ‘age’ and the learning styles dimension of content presentation – as shown in Table 8.1.

Once again, project outcomes were provided to the librarians in the form of a final student report. However, in this case faculty adviser Rogers continued to work on a weekly basis with the librarians during the following quarter in hopes of seeing these findings integrated into a viable web presentation strategy. Dialogue resulted in agreement on production of a web research portal, as opposed to individual webpages. Librarians also felt that the ‘temporal’ dimension would be better expressed through classification of students according to their levels of information competence rather than their year in college.

<table>
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<td>Visual and kinesthetic</td>
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<tr>
<td>Auditory and read/write</td>
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These insights led to developing content for a ‘beginning information competence page’, a ‘middle-level information competence page’ and an ‘advanced information competence page’. In addition, librarians determined that content should be created for those students (and faculty) who were ‘new to the library’. Once these content purposes were identified, librarians understood that their individual subject pages could link to common core content – e.g. a single beginners’ page could be created to which other pages could link. Then the information that was truly unique to a particular subject or major could be developed more fully for incorporation into the portal. This work is still in progress, as librarians continue to ‘co-create a digital age library’.23

Outcomes

Mindful that changing circumstances required redefinition of roles, goals and methods, Cal Poly librarians committed to learning how to transform their work purposes, processes and relationships. In keeping with the campus ‘learn by doing’ educational philosophy, they evolved a unique collaborative EBIP approach. Invited student research projects supervised by faculty ensured investigations of critical importance to user constituency groups. This novel evidence-producing process enabled new ways of seeing and being, including heightened engagement with campus stakeholders.

The efficacy of SSM tools prompted consideration of the feasibility of integrating systems thinking into the daily workings of the organisation. Librarians asked: ‘Can systems thinking become the lens through which we conduct ongoing enquiry sufficient to accommodate – and even anticipate – needed organisational responses?’24 In imagining ‘what this would look like’, they relied on an SSM-based human activity model to depict the emergent collaborative EBIP approach.

Figure 8.5 illustrates the evidence-based organisational social system. Element 1 acknowledges that individuals and groups inform iterative discourse (element 3) which produces evidence (element 4) that is a distinguishing feature of collaborative EBIP. The social processes involved in interpreting information to produce evidence influences shared meaning (element 4) and, over time, world view (element 2), even as it incrementally builds a collective knowledge base. Evidence informs organisational intentions (element 5) and actions (element 6). Ultimately, collaborative EBIP – fortified by dynamically changing relationships
among information systems, information technologies and professional knowledge (element 7) – fuels organisational transformation.

As librarians expanded their evidence-based information repertoire they discovered that during ‘evidence-making’ encounters with new information, learning occurred as their conceptions changed. The importance of ‘situatedness’ was underscored when they recognised that transformative change in their relationship with the subject matter was most likely to occur when both content and process were experienced ‘within context’, as learning does not occur in a vacuum. These
discoveries prepared librarians to respond to student contextualised, framed, investigated and reported research studies in co-creating learning activities with faculty partners.

Librarians now use this holistic systems thinking framework to guide their interpretation of student-produced evidence. They have forged a common language and shared tools for discussion and analysis of complexities and interdependencies within the ‘systems thinking’ framework of enterprise-level finding out, modelling, comparing and taking action. Such rich context guides iterative processes for evaluating meaningful data, comparing and contrasting multiple interpretations and infusing reflective insights – and unsolved curiosities – into a continuous learning process ‘that challenges existing ways of seeing and doing things, and can lead to some surprising shifts in Weltanschauungen, opening up novel and elegant proposals for... advancing thinking and taking action’. Librarians now advance these potentialities as they continue to ‘learn their way to change’. Concurrently, they advance campus-wide EBIP as they ‘lead by example’.

**Conclusion**

The dialogue and interaction necessary for collaborative design/redesign and development processes to occur offer librarians important practice valuing diverse perspectives and contexts. The relationship-building processes involved in implementing original research studies and then interactively interpreting results collaboratively produce two-way empathy and insight. And in the process, librarians retool in preparation for assuming new responsibilities for organising information and knowledge space as co-designers of information and knowledge management tools.

Evidence-based information exchanges among librarians and their faculty and student constituencies continue to fuel collaborative ‘knowledge-making’ and community-building partnerships within an ever-increasing circle of participants. In addition, increased experience with a variety of research-in-practice strategies – such as those described in this chapter – promises to aid librarians and the populations they serve in remaining current and relevant in a rapidly changing environment.
Exercise G

Elizabeth Connor

<table>
<thead>
<tr>
<th>Levels of thought</th>
<th>Learning exercises</th>
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<tr>
<td>Knowledge</td>
<td>Define information fluency. Define evidence-based information practice (EBIP). How does EBIP differ from evidence-based librarianship?</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Describe ways that a library organisation can foster an EBIP culture.</td>
</tr>
<tr>
<td>Application</td>
<td>Find an example outside the library literature related to using evidence-based practice to improve decision-making. Find an example in the library literature of using Bloom’s taxonomy to provoke higher-ordered thinking.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Describe the main point of this case study. Think of other organisations or institutions that may benefit from a similar approach.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Faced with the same situation or set of circumstances described in this case study, formulate a critical question that could form the basis of further research.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>How good is the evidence?</td>
</tr>
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Source: Adapted from Connor (2006)

References

2. Ibid.

www.ResearcherGate.ir


21. Rogers, ref. 13 above.


The worthwhile problems are the ones you can really solve or help solve, the ones you can really contribute something to.
Richard Feynman (1918–1988)

The contributors to this book describe a number of compelling situations and provide a wide variety of insights about using the best evidence to plan and provide library services or to teach library science graduates about the importance of evidence-based librarianship. Jonathan D. Eldredge, the most influential medical librarian in the field of evidence-based librarianship, introduces and contextualises this complex subject thoroughly and understandably.

I hope you have had the chance to scan each chapter for approaches that will work well with your practice and research interests, and try some of the exercises intended to help you apply, analyse, synthesise and evaluate existing and new knowledge.

Take a small problem that vexes you or your work colleagues and rework it into a critical question. Use this approach to develop the habits of mind that make questioning and searching the literature second nature. If critical questioning is not yet a part of your repertoire, consider conducting a systematic review of the literature related to a specific aspect of your work. Which approaches were effective?

The intention of this overarching work is to introduce evidence-based librarianship to those unfamiliar with its far reaches, benefits and rewards and to nudge those who are familiar with its concepts and principles to develop their own systematic reviews and research studies and present and publish the results of their work. In this way, librarians
can build on the work of others to improve decision-making and library practice by contributing to the professional literature.
Think, question and share your work!

Further reading


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<td>AASL</td>
<td>American Association of School Librarians</td>
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<td>ACE</td>
<td>Academic Center for Evidence-Based Nursing (USA)</td>
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<tr>
<td>ACGME</td>
<td>Accreditation Council for Graduate Medical Education (USA)</td>
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<tr>
<td>AECT</td>
<td>Association for Educational Communications and Technology (USA)</td>
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<tr>
<td>AHRQ</td>
<td>Agency for Healthcare Research and Quality (USA)</td>
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<tr>
<td>APA</td>
<td>American Psychological Association</td>
</tr>
<tr>
<td>ARL</td>
<td>Association of Research Libraries</td>
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<tr>
<td>BASRC</td>
<td>Bay Area School Reform Collaborative</td>
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<tr>
<td>CASL</td>
<td>College of Arts, Sciences and Letters</td>
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<tr>
<td>CINAHL</td>
<td>Cumulative Index to Nursing and Allied Health Literature</td>
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<tr>
<td>CML</td>
<td>clinical medical librarian</td>
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<td>CSA LISA</td>
<td>Cambridge Scientific Abstracts Library and Information Science Abstracts</td>
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<tr>
<td>CURN</td>
<td>Conduct and Utilization of Research in Nursing project</td>
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<td>DD</td>
<td>document delivery</td>
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<tr>
<td>DERP</td>
<td>Drug Effectiveness Review Project</td>
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<tr>
<td>EBIP</td>
<td>evidence-based information practice</td>
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<tr>
<td>EBL</td>
<td>evidence-based librarianship</td>
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<tr>
<td>EBLIP</td>
<td>evidence-based library and information practice</td>
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<td>evidence-based medicine</td>
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<tr>
<td>EBP</td>
<td>evidence-based practice</td>
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<td>EBPT</td>
<td>evidence-based physical therapy</td>
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<td>EPA</td>
<td>Environmental Protection Agency (USA)</td>
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<td>ERIC</td>
<td>Education Resources Information Center (USA)</td>
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<tr>
<td>ESL</td>
<td>English as a second language</td>
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<tr>
<td>FERA</td>
<td>Formative Evaluation Research Associates</td>
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<tr>
<td>GAELS</td>
<td>Glasgow Allied Electronically with Strathclyde</td>
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<tr>
<td>HCI</td>
<td>human-computer interaction</td>
</tr>
<tr>
<td>HII</td>
<td>human-information interaction</td>
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<td>ICD</td>
<td>International Classification of Diseases</td>
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