BRIEF COMMUNICATIONS

Focused assessment in an incorporated library: using loan and survey data to develop a mental health monograph subcollection

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BACKGROUND

Fifteen thousand monographs belonging to The Victorian Mental Health Library were integrated with the 6,500 item book collection of the Health Sciences Library (HSL) at The Royal Melbourne Hospital (RMH), when Royal Park Psychiatric Hospital closed in December 2000. Removalists interfiled the two monograph collections on the shelves, and onsite information services staff loaded available electronic records into the in-house catalog, tagged under the ''mental health'' collection code.

Membership in the incorporated RMH Library includes borrowing rights. It is available to all onsite RMH staff, irrespective of their specialization, and to all mental health workers across Victoria who are funded by the state government. RMH Library is a member of Kinetica, the national interlibrary loan (ILL) service under the auspices of the National Library of Australia (NLA). Participating Kinetica libraries can borrow from RMH Library's integrated book collection, as its holdings are listed on NLA's National Bibliographic Database.

The Victorian Department of Human Services' Mental Health Branch (DHS MHB) retains ownership of the incorporated subcollection. They set service performance standards and targets each year as part of RMH Library's service agreement with DHS. Key result area, ''library collection development,'' requires the library to ''[m]aintain comprehensive journal and monograph collections that are accessible and relevant to the needs of service customers.'' One performance measure is ''[b]ook collection assessment using conspectus or other Dewey Decimal Classification (DDC) based methodology,'' and its output target is ''[a]n analysed report with recommendations by December 2003.''

Conspectus methodology is a materials-centered approach that compares local DDC holdings at a given date against five levels between 0 and 4, where 0 = out of scope, 1 = minimal, 2 = basic information, 3 = intermediate, and 4 = research. A second rating is given as to the desired DDC target level. Comparing the difference establishes which subject areas should be developed. The NLA recommends the use of conspectus methodology in its collection development policy <http://www.nla.gov.au/policy/cdp/>.

At the end of the pre-assessment phase, the library manager decided that a user-centered approach utilizing loans data would be a more appropriate assessment method. Where conspectus methodology gives an assessment of what a collection contains, a study of monograph loans and monograph ILLs empirically shows what library members find useful. Further, this detail can be complemented by user survey data.

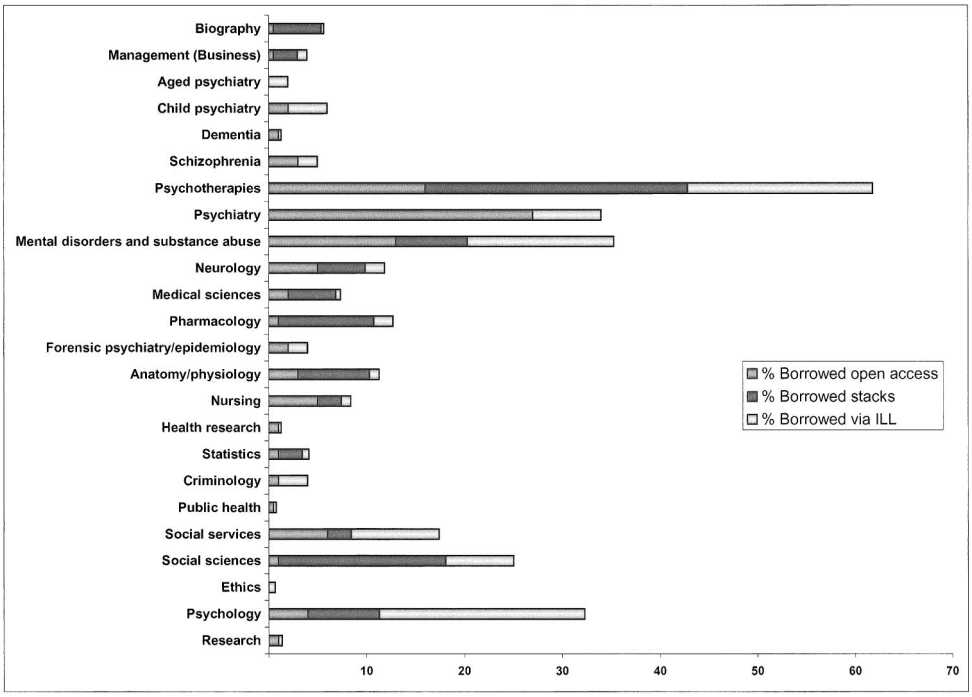
The library manager weeded all open access books before assessment began so as to give the collection a mini face-lift. This process took 13 months and ended in March 2003. All 16,751 items in the open access collection were handled (80% of all monographs), and 3,772 items (23%) were removed. The Mental Health Library Advisory Forum (MHLAF) had decreed that no mental health books could be discarded, so 1,826 mental health items published before 1970 were moved to the stacks or historical collections. HSL items dating before 1980 were discarded or moved to a cabinet storing historical material. Usage analysis then occurred.

DATA COLLECTION

Library staff collected five sets of in-house data to establish user trends: book loans, ILL monograph requests, and results of two user surveys.

- Loans from open access and stacks: Between December 2000 and early July 2003, 2,154 mental health items tagged as being on open access (25% of 8,650 items) were borrowed. Forty-one of the 4,328 stacks items were borrowed (1% of the stacks collection). Historical items were not for loan.
- ILL monograph requests: Mental health library members requested 729 items via ILL from December 2000 to mid-May 2003. Request records were exported from a FileMaker Pro database to an Excel spreadsheet, which allowed organization of titles by DDC numbers.
- Survey number one: All 1,260 mental health library members were mailed a 5-part printed satisfaction survey on the library service in April 2001. Thirty-five percent (437 people) responded, with 68% (297) completing the book collection section. Thirteen percent of respondents rated themselves as ''very dissatisfied'' or ''dissatisfied'' with the book collection, 30% ''satisfied,'' 34% ''very satisfied,'' and 13% ''extremely satisfied''; 10% of this section's respondents did not give a rating. Nonetheless, many respondents remarked in the comments area that they found the collection aged. Forty-seven topic suggestions were collated from responses.
- Survey number two: A subgroup of the library's mental health members was surveyed via email solely about the book collection in June 2003. We decided not

Figure 1
Percentage of items borrowed by Dewey Decimal Classification



to repeat a paper mailing to all mental health members, but rather to conduct a short 9-question email survey of the 640 mental health library members with registered email addresses. By this time, promotion had increased library membership to 2,293, and electronic delivery of information and communication with library staff was widely practiced. We felt that a paper survey of 2,293 would be too labor intensive and too expensive for the library to conduct. We also believed that more members would respond to an email survey.

Library staff agreed that valuable input could also be derived from mental health staff with RMH links who might not have joined the library. Thus, we also sent the survey to RMH's 1,200-member mental health program email list. Emails to both groups contained a text version of the survey and a link to the Web version. One hundred responded overall, providing 183 subject and 15 format suggestions.

Whilst the recipients of the 2001 and 2003 surveys had some overlap, the information was not correlated, as we were most interested in gathering topic-development suggestions rather than reassessing satisfaction levels. Further, we would have had difficulty deriving meaningful comparisons between the 2001 and 2003 response rates, as mental health staff who were not library members would have received only the second survey.

FINDINGS

Borrowed items fell into twenty-four DDC numbers or ranges, which facilitated comparison across the three loans groups (Figure 1). The most frequently borrowed items (68% of all loans and ILLs) pertained to five DDC subject areas: psychotherapies (18%), psychology (17%), mental disorders and substance abuse (14%), general psychiatry (11%), and social services (8%).

Demand for ILLs by their date of publication illustrated the lack of items in the subcollection published since 1994 and the users' need for information published in the last ten years (80%). This finding mirrored 2003 survey data that showed 82% of respondents favored information published in the current decade.

Data from the two surveys were tabulated and showed that 76% of feedback centered on five areas: psychotherapies (28%), general psychiatry (20%), mental disorders and substance abuse (10%), child and adolescent psychiatry or psychology (10%), and social sciences (8%).

By analyzing the loans and feedback data together, seven subject areas were identified and ranked as to their priority for development:

1. psychotherapies,
2. general psychiatry,
3. mental disorders and substance abuse,
4. psychology,
5. child and adolescent psychiatry or psychology,
6. social sciences, and
7. social services.

By dissecting ILL data for these seven areas, specific topics in the DDC groups were targeted. For example, under 616.891–616.8918 (psychotherapies), eighteen ILLs were obtained for 616.89142 (behavior therapy)

and eighteen ILLs for 616.89156 (family psychotherapy), compared to only five ILLs for 616.8918 (drug therapy).

FUTURE DEVELOPMENT

The DHS MHB and the MHLAF were presented with a report outlining these findings, and both bodies supported its recommendations. The MHLAF has committed to providing ongoing expert guidance to the library manager by supplying title suggestions from the report's target areas at each forum meeting. These suggestions will supplement ad hoc suggestions collected from patrons and titles identified by the library manager that fit into the areas targeted for development.

MHLAF members favor the purchase of multiauthor, broad-based texts that are not too esoteric or ultra-specialized. If the library manager is unsure, mental health experts can obtain some items on approval (i.e., pre-purchase) for consideration from the library's primary monograph supplier.

The library manager will take publishers' current awareness materials to each MHLAF meeting or will send such materials to appropriate forum members for comment. Usage statistics for the new items will indicate whether purchasing is following along correct lines.

Neither the MHLAF nor DHS MHB set target expenditure for 2003/04. As an initial goal, the library manager aims to spend around $18,000 (Australian) in 2004/05, the amount allocated to the book budget in 2000/01. Due to a lack of understanding of user needs, only $11,587 (Australian) was spent in that year. Since then, the book budget has been underspent by between 21% and 36%, resulting in the book-funding allocation being cut to $7,500 (Australian) in 2003/04.

The library is in a fortunate position of not having to justify increased expenditure on developing the book collection, as those in charge of allocating the budget (DHS MHB) see development as a priority. Once the subcollection came under the protection of RMH Library, the critical question became how should this be best achieved. Now that an understanding of user needs has been gained through the analysis of user trends described above, DHS MHB has expressed confidence that the best development outcomes can now be achieved.

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Major inaccuracies in articles citing occupational or environmental medicine papers and their implications

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INTRODUCTION

Bibliographic citations or references are an important component of all scientific manuscripts, but sufficient attention is not always paid to them. In fact, more than fifteen years ago, de Lacey and colleagues reported an astonishingly high rate of reference errors in articles published in general medical journals [1], and some studies since then have confirmed this phenomenon in many different biomedical journals [2–4].

These studies selected samples of citations in various periodicals and checked their accuracy, in other words, whether or not the information found in the reference lists was correct. Currently, to our knowledge, no published data has described the percentage of inaccurate citations citing specific articles. The aim of this study was to assess the accuracy of references specifically citing manuscripts concerning occupational and environmental medicine, as well as to evaluate the pattern of the errors in citing papers and the implications of these errors in terms of article citation rate. The cited papers were those published in *Occupational and Environmental Medicine (OEM),* because this journal was one well-known, if not the best-known, journal in this discipline and had the highest impact factor (IF). The second reason was that the tables of contents and the abstracts were easily accessible from the journal's Website <http://oem.bmjjournals.com>.

MATERIAL AND METHODS

The ISI® Science Citation Index Expanded (SCIE) (Thomson ISI, Philadelphia, Pennsylvania) was used to search for all the published articles that cited one of the articles published in *OEM* in 1994 or 1998 in their references. The SCIE provided access to current and retrospective bibliographic information, author abstracts, and cited references in more than 6,000 journals. This database was searched using *OEM* as the cited work and the years 1994 or 1998 as the cited year.

Table 1
Types of errors in the citations

Year	Total number of citations	Number of citations with at least one major error	Type of error						
			First author	Volume	First page number	Year	Journal	Unknown error	Total of errors
1994	2,048	74 (3.61%)	30	19	20	7	2	0	78
1998	1,299	38 (2.93%)	16	4	15	7	1	1	44
Total	3,347	112 (3.35%)	46	23	35	14	3	1	122

These years were chosen to take into account the long half-life of occupational and environmental health literature: The cited half-life of *OEM* was 4.8 years, and the cited half-lives of other periodicals in this field, the *Journal of Occupational Medicine* or the *Scandinavian Journal of Work Environment and Health,* were 8.2 and 8.4 years, respectively [5].

The accuracy of all the references recovered was controlled by comparing each reference with the article published in the printed version of *OEM.* When a reference was inaccurate, the Websites of *OEM* and Pubmed <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi> were used to search for the published article that best matched the reference and to identify the type of error in the citation. Only major citation errors were assessed (i.e., errors that involved the data elements by which references are identified in SCIE): the first author's surname and initials, the year of publication, the title of the journal, the journal volume number or supplement designation, and the initial page number.

RESULTS

A total of 314 articles were published in *OEM* during the two years studied, consisting mainly (80%) of original papers.

The number of citations of an *OEM* publication from 1994 or 1998 that were recovered from the SCIE was 3,347. One hundred and twelve (3.35%) citations were inaccurate, with at least 1 major error. The most common errors concerned the name of the first author and the first page number of the article (Table 1).

On the whole, these citations included 122 errors, because 9 citations included more than 1 major error. Eight citations included 2 errors in each one, and one citation included 3 errors (wrong year, volume, and first page number). Furthermore, 11 incorrect citations were found in duplicate or in triplicate. The same error in the author's name, first page number, volume, year, or journal was repeated in 2 or 3 citations originating from different citing papers.

Searching SCIE identified 3,347 articles citing 387 different 1994 or 1998 *OEM* articles. Different articles were defined as articles with different first author, volume, page number, or year. Each article was cited between 1 and 41 times.

Among the 387 cited articles, 99 articles did not exist; the citations did not permit us to identify the articles in the 1994 or 1998 volumes of *OEM.* Therefore, only 288 articles were correctly cited and in fact existed (i.e., had really been published in *OEM* in 1994 or 1998). Among the 99 ghost articles, the citations were inaccurate in 80 cases but concerned, in fact, articles that had been published in *OEM* in 1994 or 1998 and that had been correctly cited elsewhere. An editorial* had been cited only once, inaccurately. Finally, 18 articles cited as articles published in OEM in 1994 or 1998 had, in fact, been published in *OEM* but in another year (14 cases), had been published in another journal (2 cases), or did not exist at all (one case).

Lastly, among the 314 articles published in *OEM* in 1994 or 1998, 288 (92.04%) were cited at least one time in one of the 6,000 journals covered by the SCIE database. That means that 25 articles (7.96%), in fact, had never been cited.

DISCUSSION

The SCIE is the best-known method in the health sciences to identify citing papers of selected articles. It certainly underestimates the real number of citations, because the SCIE database covers ''only'' 6,083 journals. Nevertheless, nearly all the major journals (36 of 38) specializing in occupational health, which were previously identified [6], were indexed in SCIE; only *Medicina del Lavoro* and the *International Journal of Occupational and Environmental Health* were not. Therefore, the majority of the articles citing manuscripts originating from *OEM* were probably recovered by this study.

Only errors concerning the first author's surname and initials, the year of publication, the title of the journal, the journal volume number or supplement designation, and the initial page number were included, because errors in these fields can seriously hinder retrieval of the cited article, whereas errors concerning the other authors or the title of the manuscript would not affect the retrieval of the full article.

Papers dealing with accuracy of references usually included all types of errors, especially in the article title, which was the main source of mistakes [7], and the high rate of reference errors in articles found in some studies were not easily compared to those presented in this study. Nevertheless, Fenton et al. [2] also divided errors into minor, intermediate, and major.

* COCKCROFT A. Occupational and environmental medicine and the London faculty of occupational medicine [editorial]. Occup Environ Med 1994 Jul;51(7):433–4.

They found a rate of major errors of 11.90% but observed that the higher the IF for the journal, the lower the number of errors detected in its papers. The highest journal IF in their study was 1.118, whereas the IF of *OEM* was 1.958 in 1999. Therefore, the rate of 3.35% remained unacceptably high, especially considering that 0.27% of citations included more than 1 major error.

The onus should be on the authors only to quote references that they have, in fact, read to ensure the accuracy of the bibliography. Nevertheless, some citations are based solely on reading the abstract and, even more problematic, on the simple reproduction of a citation found in another article. In this study, the fact that some citation errors are found in duplicate or triplicate, originating from different citing articles, clearly indicates that the ''copy and paste'' function is sometimes used improperly. Furthermore, reading the abstract instead of the full article is demonstrated, for example, by the analysis of citations quoting the article by Stucker and colleagues.† Two independent citations reproduced the error in the author's name found in MEDLINE (Strucker instead of Stucker). This unscientific approach should be discouraged, because it can lead to erroneous interpretation of the real conclusions of a scientific study.

Because journal IFs are readily available, it has been tempting to use them for evaluating individual scientists or research groups, but the dramatic shortcomings of such an approach have been highlighted [8]. Garfield, creator of the journal IF, has therefore proposed relying on the actual citation counts for individual articles and authors when trying to evaluate a person's publication list [9]. However, apart from incomplete retrieval of information for practice and research, citation errors can result in authors not receiving credit for their publications and thus bias this citation count.

A good example is provided in the article by De Zotti and colleagues.‡ Looking at the results provided by SCIE, this article appeared to have been correctly cited 41 times (i.e., cited with the right first author, journal, year, volume, and first page number). Nevertheless, it was also cited once with a wrong first page number (552 instead of 548) and five times with an error in the name of the first author (twice as Larese F, who was the second author, twice as Zotti R, and once as De Zeotti R). The correct number of citations was therefore 47 and not 41, an underestimation by 15% of its real ''citation score.''

Another striking example is the article by Ilg and colleagues,§ which had been correctly cited 8 times. It was, in fact, cited 4 more times, twice with an error in the first author's name and twice of the first page number. The correct citations score of this paper was, therefore, 12. Searching only for the name and initials of the first author would have retrieved only 10 citations, leading to an underestimation of the citation score for this author and this paper of up to 25%. Such underestimation of the citation score can be very prejudicial to individuals and institutions, because this score is becoming a key indicator that not only influences academic advancement but may also have an effect on an individual's or an institution's chances of attracting research funding [10].

CONCLUSION

This study demonstrates inaccuracies in references in 3.35% of the 3,347 papers, originating from different periodicals and citing articles concerning occupational or environmental medicine published in the leading journal in this field. Poor reference accuracy seems, therefore, to be a problem in occupational and environmental health literature. This phenomenon, which hinders the ability of readers to access the article and thus eventually to quote it and which directly affects the assessment of single authors' citation rates, should be taken into consideration by authors, reviewers, and editors. These results warrant efforts from all stakeholders to reduce these inaccuracy rates as much as possible.

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Constructing a concise medical taxonomy

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How do you construct a taxonomy of medicine concise enough to mount on a single Web page and comprehensive enough to describe the contents of a set of leading journals whose coverage ranges from public health to molecular biology? This seemingly impossible task was recently presented to the publishing division of the American Medical Association (AMA) to improve subject access to its journals' Websites.

Topical indexing of medical Websites is most familiar from the broad lists of diseases and conditions designed to provide easy access to consumer health information. Indexing of the professional literature, on the other hand, has largely remained in the domain of MEDLINE. With AMA's indexing already based on MEDLINE's Medical Subject Headings (MeSH) vocabulary, creation of a Web taxonomy became a matter of adapting the multiple hierarchies of the more-than-1,000-page MeSH thesaurus to a concise listing of topics that would meet Web publication's requirements for an easy-to-display index while retaining MeSH's inclusivity and scientific validity. AMA took as its precedent the simplified access to MeSH built into the Catalogue and Index of Health-related Internet sites in French (CISmeF) at the University of Rouen [1].

Creating and implementing the taxonomy was a twofold process: first, selecting and arranging terms and, then, constructing a lookup table mapping each of the selected terms to corresponding terms in the MeSH vocabulary. In this way, the broader terms of the Web taxonomy could be automatically associated with the MeSH indexing already in use, avoiding the time-consuming chore of hand tagging the back file of articles. Using MeSH as the basis of the Web taxonomy also ensured that the electronic index shared not only the comprehensive coverage and consistency of a well-maintained controlled vocabulary but also the advantages of its hierarchical trees.

SELECTION AND DISPLAY OF SUBJECT TERMS

Selecting and arranging subject terms involved surveying the most frequently assigned MeSH terms and comparing them with a list of topics drawn up by editors that, in their judgment, best highlighted the content of their journals. Making a coherent whole of the disorganized assortment of topics and subject terms that resulted was not a simple job, not big enough for consultants or stand-alone software but still requiring staff time, forethought, and numerous iterations. For help, those involved in the project consulted the published sources on taxonomies and their construction.

Web postings offered much information on cutting-edge applications of existing taxonomies, often relating to such innovative interfaces as topic maps, but relatively little on the principles and mechanics of choosing and organizing appropriate subject terms—the ground floor principles of building a taxonomy—as opposed to employing an established vocabulary in conjunction with the emerging standards and architectures of the networks. AMA indexers and editors, therefore, went further back to the library literature on such subjects as indexing, vocabulary control, and thesaurus construction. This literature predates but often still underlies today's dynamic applications of information technology. Lancaster's much cited *Vocabulary Control for Information Retrieval* [2] was of particular help.

Taxonomies in general are best known as hierarchical arrangements of terms that describe a particular branch of science or field of knowledge. Ideally, terms are selected and arranged to be mutually exclusive, thus creating an ordered universe with a place for everything and everything in its place. Unfortunately, medicine does not lend itself well to such pure rationalism. Many diseases, not falling neatly into one category or another, require multiple postings. The term ''Lymphomas,'' for example, appears in three MeSH hierarchies under ''Neoplasms,'' ''Hemic and Lymphatic Diseases,'' and ''Immunologic Diseases.'' ''Multiple Sclerosis'' is listed as an ''Immunologic Disease'' and then posted twice as a ''Neurologic Disease,'' once as a narrower term under ''Autoimmune Diseases of the Nervous System'' and again under ''Demyelinating Diseases.'' As a result, the sprawling MeSH schedules tend to resist the compression and simplification sought in indexes intended for the graphic interfaces of the Web. Lancaster's caveat on the trade-offs involved in reconciling the strict logic of a hierarchy with user-friendly display is especially pertinent to the screen-by-screen environment of electronic publishing: ''Extremely large hierarchies involving multiple relationships and levels, however, are difficult to display intelligibly in graphic form. Moreover they tend to waste space'' [2].

FACETED ALTERNATIVE

Faceted indexing is often employed to create more concise, Web-friendly displays. It is widely used by Web retailers to index offerings such as apparel or appliances with each distinct product line posted once in alphabetical order or in simple classifications and then accessed through a series of secondary attributes, or

facets, such as model number, size, price, or color [3]. In such an indexing system, ''Multiple Sclerosis'' would be posted only once, as opposed to its three postings in MeSH, and then qualified to allow searchers to address that aspect of the disease of greatest concern to them, for example, ''Multiple Sclerosis/immunological aspects of,'' ''. . . /neurologic aspects of,'' and so on. Faceted indexing is offered, in part, through MEDLINE's MeSH browser, where, after selecting a term from a hierarchy, searchers may qualify it by checking off a series of subheadings that allow access to that part of the literature most relevant to their special interests.

For the most part, however, while faceted indexing can be successfully applied to such objects as, say, refrigerators—which may be distinguished one from another by height and width, storage capacity, price, and color—it is not entirely well fitted to the complex, interrelated systems and concepts pertaining to organic life forms. Even the qualifiers that may be added to MeSH headings (diagnosis, etiology, treatment, etc.) operate only in relation to the in-depth indexing performed by the National Library of Medicine (NLM) on the millions of articles in their database. The sheer volume and range of data in MEDLINE exhibits a granularity, to use information technology (IT) terminology, that makes a partially faceted retrieval scheme possible. Less voluminous databases generally will not support distinctions such as that between the pathology and physiopathology of a disease as are made on MEDLINE.

IMPLEMENTATION

To meet needs of the both neurologists and immunologists without resorting to facets and without the means to construct elaborate custom-made hierarchies, AMA's simplified taxonomy retained the often arbitrary boundaries of medical specialties by mapping topics only to the most appropriate occurrences of matching or equivalent MeSH terms in the MeSH trees. The topic ''Immunologic Diseases,'' therefore, was mapped to pick up ''Multiple Sclerosis'' in MeSH schedule C20, while ''Neurologic Diseases'' was mapped to pick up the same disease in schedule C10 ''Diseases, Neurologic'' (even though the articles retrieved would be the same). Mapping to the most appropriate occurrences in MeSH trees, however, allowed the capture of the pertinent narrower terms listed beneath the matching MeSH term. Clicking on ''Neurological Diseases/Multiple Sclerosis,'' therefore, picks up articles indexed under the narrower MeSH terms listed beneath ''Multiple Sclerosis,'' such as ''Neuromyelitis Optica.'' Although it is only used selectively and not apparent to the user, the MeSH hierarchy remains the implicit authority behind most entries in the Web taxonomy.

The final taxonomy was based on fifty-three general topics derived from established specialties such as dermatology and rheumatology, recognized diseases and disease groups such as cardiovascular diseases and infectious diseases, therapies and diagnostic techniques (''Drug Therapy'' and ''Radiologic Imaging''), and patient groups (''Men,'' ''Women's Health,'' ''Pediatrics,'' ''Geriatrics''), as well as a mixture of miscellaneous topics such as ''Internet in Medicine'' and ''Quality of Life.'' These topics were arranged in alphabetic order and subdivided, where necessary, along traditional lines or according to journal content. ''Cardiovascular System,'' for example, was subdivided into ''Arrhythmias,'' ''Myocardial Infarction,'' ''Congenital Heart Defects,'' ''Congestive Heart Failure,'' and ''Thromboembolism,'' as well as a series of more widely discussed interventions as follows:

- Cardiovascular System
  - Arrhythmias
  - Cardiovascular Disease/Myocardial Infarction
  - Congenital Heart Defects
  - Congestive Heart Failure/Cardiomyopathy
  - Cardiac Diagnostic Tests
  - Cardiovascular Interventions
    - Revascularization
    - Pacemakers/Defibrillators
    - Thrombolysis
    - Cardiovascular Interventions, Other
  - Venous Thrombosis
  - Cardiovascular System, Other

Subdivisions resulted in 374 topics and subtopics, few of which, in the end, were mutually exclusive—most articles fell into multiple categories. Articles whose principle topic is ''Colonoscopy'' would be accessed by clicking either on ''Gastrointestinal Diseases'' or on ''Colon Cancer'' in the topic index. An article on the effects of hydrochlorothiazide on hypertension and cardiovascular disease among the elderly would be found by clicking on ''Hypertension,'' ''Cardiovascular Disease,'' or ''Aging/Geriatrics.''

In most cases, mapping the topics to MeSH indexing terms was straightforward, frequently a one-to-one correspondence. However, in some instances, editors viewed their content quite differently than the editors of the MeSH schedules, and, for the sake of using terminology known to readers who work in the field, AMA did not insist on sticking to terms established for indexing purposes. Neurology, for example, was subdivided not only into topics representing major neurological disorders such as ''Alzheimer's Disease'' and ''Parkinson's Disease,'' but also into interdisciplinary fields such as ''Neuroendocrinology'' and ''Neuroophthalmology,'' for which mappings were not only to the diagnoses that editors associated with these topics, but also to combinations of the MeSH indexing terms. (e.g., ''Grave's Disease'' AND ''Optic Neuropathy'').

CONCLUSION

In the wider world, the development of taxonomies has come to constitute a big ticket item in Web publishing and corporate intranets, with development costs estimated in a recent report at half a million dollars for collections of 500,000 pages or more [4]. In medicine,

costs tend to be higher than for other disciplines, usually involving the development of complex rules for applications of the Unified Medical Language System (UMLS), a synthesis of more than 100 biomedical vocabularies that forms the backbone of most automated medical indexing systems [5].

AMA built its taxonomy, on the other hand, to meet immediate needs in the normal workflow of busy editorial and production departments. As a result, much of the fine-tuning required for interpretation of ambiguity in the indexing terms posted for the compilation of print indexes proved impractical. Therefore, not all relevant articles could automatically be tagged for topic collections, including content relating to such high interest topics as bioterrorism and severe acute respiratory syndrome (SARS). Such content, often related to current events or emerging research findings, required hand tagging. Overall, however, a sufficiently unambiguous correspondence existed between existing indexing terms (a subset of MeSH vocabulary) and taxonomy topics to achieve an acceptable degree of relevancy and recall in automatically tagging the more than 14,000 articles published in *JAMA* and the Archives over the past five years. (To judge relevancy and recall, collections were selectively cross-checked against sets retrieved from PubMed using corresponding search terms or combinations of search terms for AMA titles only.)

Would we recommend AMA's low-cost, high-yield approach to others? Yes and no. The success of the project largely depended on the controlled MeSH vocabulary already embedded in the standardized general markup language (SGML) of AMA's journals. This advantage allowed editors, indexers, and programmers to get a handle on content without resorting to the relatively expensive and time-consuming use of tools such as UMLS to analyze keywords in titles and abstracts. The volume of data, the necessarily large number of topics in the all-medicine taxonomy, and the short time frame from conception to implementation, on the other hand, still made the task a challenging one. Many decision makers might prudently have opted out of undertaking the project in house—with its attendant, not always safe, assumption of a sufficient supply of time, imagination, and cooperation among staff in different departments—in favor of sending the work out for pricey contractual delivery or, more likely given the costs of handling a medical vocabulary, have squashed the initiative entirely. Finally, however, a balance of cost constraints and needs of clinician readers to access content on their own terms argued in favor of the pragmatic approach taken. Determining whether or not the collections accessible through the taxonomy have met their goals will require both asking selected readers about the usefulness of this feature and assessing Web traffic to the page. The taxonomy may be viewed at http://pubs.ama-assn.org/collections/.

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One library's experience with live, virtual reference

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INTRODUCTION

The McGoogan Library of Medicine offered a live, virtual reference service to the University of Nebraska Medical Center (UNMC) community and to the general public from July 2002 to February 2004. This communication is a brief account of our library's experience with this service and the reasons for discontinuing it.

CASE STUDY

During the early years of the twenty-first century, we, like most librarians, noticed the dramatic increase in the number of library-based, virtual reference services offered across the United States and the world. We decided to try using virtual reference technology to reach our distance faculty and students. We obtained funding for this service through the UNMC Educational Technology Small Grant Program.

We chose the Virtual Reference ToolKit software from Library Systems & Services (LSSI) <http://www.lssi.com>. Like all other synchronous virtual reference products, the LSSI software would allow us

to provide real-time, Internet chat service. The LSSI product also provided a combined chat and co-browsing feature that would allow the librarian to escort the user to the appropriate electronic resources. In addition, LSSI's product included a virtual classroom feature that would make it possible to provide synchronous instruction to multiple remote users, regardless of their location.

We named our virtual reference service AskMac. To promote the new service: (1) we placed an announcement in UNMC's all-campus newsletter; (2) we distributed AskMac promotional and informational items during the student orientation for fall 2002; (3) we gave AskMac demonstrations in library classes held both on and off campus for students, faculty, public librarians, and residents of Nebraska; and (4) we placed an AskMac button, linked to the AskMac service entry page, on every page of the library's Website.

Initially, we offered AskMac service twenty-two hours per week with two-hour shifts rotated among six librarians. In May 2003, we expanded the service to thirty-five hours per week. Commitment from those directly involved and their belief in the service was a major factor in the expansion of the service. No additional staff members were used to expand the service hours.

In June 2003, we noticed a marked increase in technical problems. These problems occurred concurrently with the purchase of the Reference Division of LSSI (including Virtual Reference ToolKit) by Tutor.com [1]. The librarians who staffed AskMac were frequently dropped from the Virtual Reference ToolKit server and forced to spend half an hour or more trying to log back in. During these times, the service was unavailable to users. To make matters worse, the co-browsing feature of the software did not work consistently, and librarians were frequently forced to rely on the ''chat'' function of the software alone. By September 2003, the vendor appeared to have resolved these issues.

In July 2003, we attempted to conduct a library training class using the software. Unfortunately, the bibliographic databases and presentation slides needed to teach the class did not work with the software at class time. Perhaps most significantly, the invited users were not able to enter the ''classroom.'' The failure of this virtual classroom experiment was a real disappointment. One of our primary reasons for exploring a virtual reference service had been our desire to provide synchronous instruction in the many homes of our distance students.

Much of our displeasure with the LSSI product stemmed from unexpected difficulties like the never-improved, extreme slowness of the product's chat function. However, some of our irritation was generated by known shortcomings of the product. For example, we learned that the software was incompatible with pop-up boxes when we were trained on the software. Initially, this inconvenience was not major. Then, we implemented two pop-up heavy improvements in our library's electronic services. We added Java-based, pop-up menus to our home page. The pop-up menus provided quick access to the library's most frequently used electronic resources and to our contact information. Because these menus did not even appear inside the AskMac co-browsing feature, librarians were forced to teach AskMac patrons more laborious methods for accessing our electronic resources or, alternatively, were forced to communicate instructions for use of the pop-up menus in the chat mode.

The second, problematic, pop-up-heavy resource was our new electronic journal finder. AskMac librarians could guide patrons through initial steps in use of the electronic journal finder but had to relate final steps in the slow-responding chat mode. We should note that although the librarians were frustrated with the technical problems, feedback from AskMac users indicated that they were generally happy with the service.

Finally, the difficulties with the service and low usage statistics led us to reexamine the costs and benefits of the service. According to statistics provided by the vendor, from July 2002 through February 2004, 144 sessions involved AskMac users posing actual reference inquires. These 144 sessions included disconnected calls, as well as sessions in which the patron failed to respond to chat messages from the librarian. The virtual reference service, therefore, brought in an average of 7 reference questions per month.

An analysis of the session transcripts indicated that most users were either on-campus faculty and staff or consumers and professionals from outside Nebraska. While we were pleased to provide our on-campus patrons with a new way to use the library, we had initiated the service to serve UNMC's growing number of distance students and faculty, UNMC-affiliated users unable to come into the library, and residents of Nebraska. None of these populations proved to be frequent users of the service.

Many of the questions asked through the virtual reference service were either ready reference questions that could be answered more quickly via email or telephone or were complex reference questions that were too time consuming to be answered satisfactorily using the slow, co-browsing/chat format.

Additional work with the virtual classroom portion of the software showed that this function did not work consistently and was too cumbersome to have a realistic use in provision of library education.

Before discontinuing the service, we wanted to know what sorts of virtual reference services other academic medical libraries provided. In December 2003, we reviewed the Websites of the medical libraries at the 126 US medical schools in the Association of American Medical Colleges (AAMC). We noted that 34 of these libraries offered a virtual reference service, 73 promoted an email reference service, and 19 did not noticeably promote any Internet-based reference services. Of the 73 medical libraries that offered an email service, 24 were on campuses with affiliated, nonmedical libraries that offered a chat service. It would be interesting to know why these medical libraries chose

not to use virtual reference, when it is available on their campuses.

The McGoogan Library of Medicine decided to discontinue the AskMac service at the end of February 2004. The total number of questions received from our targeted distance users and our on-campus population, when considered in light of the high cost and problems with the software, was too low to justify renewing our service contract.

We, of course, considered switching to a less expensive form of live, virtual reference service. Other commercial vendor products that would be more compatible with our resources were considered. Free instant messenger or chat programs were also considered but dismissed because of the difficulties that would arise in collecting statistics and helping patrons perform software downloads. Based on our experience, we felt that regardless of the product, any chat service would bring in a relatively low number of questions, a number too low to justify the effort involved in maintaining the service. We considered a consortial or collaborative approach to providing virtual service unsuitable, as our service tended to draw questions specific to the McGoogan Library's collections and services.

With the discontinuation of the virtual reference service, we began to promote the email reference service and our toll-free telephone number more heavily. These services had served as back-up methods for reference help but have now been brought to the forefront as reliable, alternative paths to reference assistance.

CONCLUSION

The next generation of health sciences students (now in high school and junior high) use instant messenger and chat software on a regular basis [2]. When they enter college, they might expect and demand assistance in this same venue. Although we have found virtual reference service to be a costly and problematic way to handle a low number of reference questions at the present time, we will continue to monitor the virtual reference service arena in academic health sciences libraries and routinely reevaluate the need for such service at the McGoogan Library of Medicine.

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