

Evidence into practice: evaluation of an innovative information literacy model for first year Health Sciences students

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Abstract

In 2009, the Faculty of Health Sciences at La Trobe University implemented a common first year across all health disciplines, which involved a move to enquiry-based learning, with large numbers of students (~1700) working in cross-disciplinary teams. This paper will examine the successful model used to develop the health sciences common first year information literacy program, and how the Library in collaboration with the Faculty developed online information literacy modules to support this initiative. The paper will also report on outcomes of the thorough evaluation program and process, which includes modules usability testing, feedback from academic staff and students, and student-learning outcomes from the student pre and post-experience surveys conducted during 2009. The impact of this initiative in providing foundation research skills via this scholarly approach will be reviewed and evaluated in relation to the first year student experience.

Introduction and Literature Reviewed

Educating large numbers of entry-level students in a single cohort in inquiry research skills presents significant challenges and is difficult to deliver effectively as noted by Gunn & Hearne (2009). If students are located across multiple campuses, a sustainable, large scale and equitable approach for any course content is required (McAlpine, Pannan & Fitzmaurice, 2008). What should constitute a program for inquiry research skills? According to Bruce (2004) “four critical components of an information literacy program” (p.13) are: resources (e.g. online modules); learning opportunities in the curriculum; activities conducive to requiring information searching; and opportunities to reflect and show learning of effective search strategies. Bruce (2004) also mentions, “Advocates for information literacy are often concerned about the need to promote the impact of information literacy on academic achievement” (p.4). Conducting a pre/post test is one method used to provide evidence of some impact. Salisbury & Ellis (2003) used a pre/post test to evaluate students’ inquiry research skills, and found that face-to-face instruction and online information literacy instruction yielded consistent student achievement.

A selection of literature reviewed for this current project relating to pre/post survey design and implementation resulted in various survey designs being considered including the ENIL Questionnaire on Information Competencies (ENIL, 2005), the CAUL Information Skills Survey (Catts, 2005), and the Mittermeyer survey (Mittermeyer & Quirion, 2003 and Mittermeyer, 2005). Internationally benchmarked and validated, the Mittermeyer survey (a multidisciplinary tool), was considered the best fit for the current environment and student cohort. Further support to this design was the use of this instrument by another Australian

university (Bernath and Jenkin, 2006). This resource, in addition to local expertise, informed the development of the questionnaire used in this research¹.

As well as evaluating a program's impact on student knowledge, it is important to assess the usability and usefulness of resources used. When designing the usability testing for this study, ideas from the literature were investigated. In reviewing twenty-two case studies of usability testing of academic websites (conducted 1999-2004), Letnikova (2008) reported on the importance of particular issues. These included: the role of the wording of questions was critical; testing should cover parts of the interface related to common tasks; tasks need to be able to be completed within a given time frame; and most important, inclusion of a morale boosting 'warm-up' task first. Letnikova also points out that it can be difficult to determine why a participant fails to perform a task – was it due to poor website design, wording of the usability testing, or lack of research skills. This is also noted by Vaughn and Callicott (2004), who state that "usability presumes that all problems associated with a web site stem from design issues" (p.13), where in fact often the actual issue is the lack of research skills and knowledge of library terminology. Other usability testing guidelines suggest, "Conducting a test where representative participants interact with representative scenarios", to ask participants to comment either during the task or afterwards, and limiting the number of participants testing to no more than six (Research-based web design and usability guidelines, 2006, p. 188). Although the usability guidelines were related to the web, many of the issues were considered, in relation to the design of usability testing for modules in this research.

Background

The move to a common first year for all twelve health sciences' courses at La Trobe University provided the ideal opportunity to review the information literacy program, to provide students with the chance to achieve a foundation level of graduate capability appropriate for the first year of university study. In collaboration with the Faculty, the Library worked to create an innovative approach to teaching research skills to first year students in an online learning environment, aligning with the Library's Information Literacy Policy and Framework² and to suit the enquiry based learning (EBL) design. Academic skills were to be embedded into a cornerstone subject, so the development began with the creation of learning and enabling outcomes inclusive of information literacy. 'Construct and implement effective research strategies to identify and locate authoritative sources of information' as described by the Faculty of Health Sciences, was to become the relevant enabling outcome. For example, the program consisted of structured research tasks and facilitated reflection on the research process; online web based modules³, which were the primary source of instruction⁴; an online quiz worth 5% of students' assessment; and a library discussion board in the Learning Management System (LMS) amongst other library support.

The Initiative

The online modules were specifically created with required elements to support EBL, alignment with the curriculum, learner-centred, engaging, effective, scalable, and available at point of need, to meet the research needs of internal and external users across geographic

¹ Based on Mittermeyer (2003) – used and tailored with permission

² La Trobe University Library Information Literacy policy and Framework: www.lib.latrobe.edu.au/about/infolit.php

³ Health Sciences Information Literacy Modules: http://latrobe.libguides.com/health_sci

⁴ Students were able to access a variety of library support, and perhaps peer support, in addition to the modules

boundaries. The modules utilise LibGuides software (Springshare), and consist of text with visuals of screens interspersed, practice exercises and multimedia, with examples embedded from the cornerstone subject⁵. The content covers basic library skills to finding different types of material by topic, which did not have to be completed in a linear fashion, although the progressive nature of skills development was taken into account⁶. Within the subject materials in the LMS, students were referred to the modules in several places, in effect, at point of need. The first online module ‘Can’t I just Google?’⁷ contains a video and information about the limitations of using Google for health sciences students. Using that initial module as a base, the embedding of relevant tasks in the cornerstone subject was designed to guide the students to make use of the learning opportunities in specific modules at specific points.

In the first enquiry for the subject, the students were required to find a range of materials from a reading list, summarise, and provide references in APA style. Students had to recognise what type of resource it was, and know what element in the citation to type into the Library catalogue to retrieve it, often difficult for first year students (Fisch, Karasmanis, Salisbury & Corbin, 2009a). Students were referred to the specific online module related to finding items on a resource list for assistance and referencing with APA at the relevant points. Following on from this task, students had to reflect in the subject workshops about the process and discuss any issues arising. The same pattern followed for the second enquiry and involved the modules relating to search strategy planning, finding books, journal articles, credible internet information, media reports, newspaper articles, and health and social statistics. The assessable online quiz was based on the content in the modules, and designed to test student skill development at this stage.

The information literacy program consisted of library support elements, adjusted throughout the year as data emerged from the evaluation. Assistance at the research help desks, email and online chat was available, as well as a series of optional library question and answer sessions. In second semester, librarians provided assistance by monitoring the library discussion board, the direct result of knowledge about the progress of the students with evidence from the evaluation.

Methods of evaluative data collection and analysis

The Library conducted an evaluation of the program and library services. A selection of the results will be reported later on in this paper. This gathering of quantitative and qualitative data provided a substantial picture of the stakeholders’ experiences in three key areas: scholarly literacy (pre and post-experience surveys and quiz analysis), use of library services and resources (modules usability testing, library discussion board), and stakeholder feedback (from students and staff).

Pre-experience survey

One of the projects to evaluate the development of library services in response to the needs of the new pedagogical model involved a pre-test of first year health sciences students, to assess

⁵ Health Sciences Interprofessional Practice A & B

⁶ The modules are ordered from top to bottom with basic skills guidance at the top and more complex skills guidance relating to planning a search and finding a range materials by topic further down

⁷ This animated video was created by the library and the CTLC (Curriculum Teaching & Learning Centre) at La Trobe University http://latrobe.libguides.com/health_sci_google

their entry-level skills and knowledge of the scholarly information seeking process. This pre-test was conducted in March 2009, and was complemented by a post-test in September 2009.

To enable the assessment of the entry-level skills in semester one, a print survey⁸ was administered during workshops in week one. 1,000 usable surveys were collected, resulting in a response rate of over 62%. The survey contained twenty questions: four demographic; five on the use of Library resources and previous internet experience; and eleven questions on the discovery and use of scholarly materials. The 'knowledge' questions covered assessment of the quality of an internet site, knowledge of peer reviewed journal articles, referencing, search strategies and plagiarism. Students were given a 'score' based on correct answers to the knowledge questions. Cross tabulations of the respondent scores and campus, health discipline and educational attainment, provided a better understanding of the differences in entry-level information seeking skills and knowledge within these subgroups.

The entry-level scores showed only a mean of 2.8240 correct answers out of a possible score of eleven. Noting that more than half the knowledge questions were left blank (e.g. answers may not be wrong, but students may have run out of time), each individual was given a statistical 'score' based on their correct answers to the eleven knowledge questions. The scores revealed that no respondent had more than seven correct, and that 93.1% had less than 50% correct. Further analysis showed that 44.1% of the cohort answered correctly only one or two of the eleven knowledge questions.

Results revealed difficulties in understanding scholarly journal literature, likely to be an unfamiliar resource type for new university students. Selected results showed that only 23% of students were able to identify a journal article citation, and only 13% were able to recognise that the journal title is the element to search for in the Library catalogue. In a University of Melbourne study (Salisbury & Ellis, 2003), only 22% of the study group had the skills to locate the journal article using the library catalogue, corresponding closely with their 2002 study in which also only 22% were able to complete a similar task. Similarly, only 35% of students surveyed in the Mittermeyer (2003) study could identify a journal article citation.

To find scholarly journal articles on a topic, only 11% of respondents would search in a database with 33% answering Google as the preferred search tool. Respondents were tested on their knowledge of keyword searching, and here the results were more promising with a majority of 77% selecting the right answer, indicating that entry-level students have a good grasp of the influence of keyword selection on search results in this context. It may be that Google use has given this student cohort a high level of familiarity with how keywords function in the search strategy. Following on from this, 32% of students identified correctly key or significant words to identify a concept in a search query. When respondents were asked what criteria are essential to evaluate the quality of an internet site, 23.8% of respondents selected the three correct elements, which included date, credible author and responsibility for the site clearly stated. However, any response which included any one of these elements was 73.9% (even if it included other answers), therefore showing some indication of awareness of relevant criteria, in that less than one third of responses included the best answer, and the relevant criteria is included in almost three quarters of responses. Results in full are available from the report (Fisch et. al. 2009a).

⁸ Appendix to Fisch et. Al. (2009a)

This study demonstrated the need for continual guidance from first year onwards, and provided rich data on which information literacy skills instruction for this cohort could be tailored, thereby, setting students on a learning continuum so they are able to develop foundation skills early, and progress to a proficient level of skills by their final year. In effect, the evidence from the initial survey was instrumental in directly enhancing the existing program to provide further support for the first year experience by upgrades to the online modules, provision of face-to-face question and answer sessions, and establishing the online library discussion board for students in the LMS.

Assessment Quiz

The online assessable quiz (worth 5%) was a formative exercise, which consisted of questions, tailored to the content in the information literacy modules. Results overall show an average score of 12.15 out of 15, the best of three attempts being taken as the score. A selection of quiz results for question categories similar to those in the pre-experience survey, show a very positive outcome for the students. For example, 71% of students answered correctly questions relating to finding items on a reading list, and 88% answered correctly questions relating to APA referencing. Initially, the quiz seemed to show students skill rates developing rapidly with students improving significantly since the pre-experience survey. However, as a student had three chances to do the quiz and improve their scores, the improvement may be linked to ‘surface learning’ i.e. superficial retention for examinations, rather than long-term knowledge and understanding of inquiry research skills.

Post experience survey

The post experience survey was completed in September 2009, to track the skill development of this cohort, measure the effectiveness of library support, and feed into further interventions. 1,083 usable surveys were collected, yielding a response rate of 67.35%. Results from the post-experience survey showed an overall improvement in responses since the pre-experience survey. Some examples include recognition of a journal article improving from 23-59%; referencing from 28-59%; knowledge of Boolean searching from 37-48%; evaluation of an internet site from 24-38%⁹ and knowledge of peer reviewed journals from 4-17%. Encouragingly the post-test had a sharp drop in the numbers and percent of invalid and ‘don’t know’ answers.

In the pre-test, more than half the knowledge questions were left blank, and the scores revealed that only eight respondents scored more than seven, whilst in the post-test thirty six respondents scored more than seven, with one student achieving a perfect score of eleven. In the pre-test, 93.1% had less than 50% correct, this improved to 75.4% in the post-test. An analysis of respondents scoring more than 50% was encouraging with 24.7% at this level in the post-test, an improvement from 6.7% in the pre-test. This shows the mean score significantly higher at the post-test than at the pre-test, but still quite low with a slight improvement in score from 2.8240 to 4.0563 out of a possible score of eleven. Some question types show an opportunity for further improvement which can be the focus of development for this cohort in second year and beyond.¹⁰ Results in full are available from the report (Fisch, Karasmanis, Salisbury & Corbin, 2009b).

⁹ Correct answer included 3 elements of quality but many respondents were able to identify 1-2 correct elements

¹⁰ Question design flaws, evident during analysis of answers for some questions like ‘evaluate an internet site’, were also seen to have an impact on results

Table 1: **Pre and post experience survey** - selected results comparison

| Question Type | Pre-experience result March 2009 | Post-experience result September 2009 |
|-----------------------------|-------------------------------------|--|
| Journal article citation | 23% correct | 59% correct |
| Referencing | 28% correct | 59% correct |
| Boolean searching - AND OR | 37% correct | 48% correct |
| Evaluation of internet site | 24% correct | 38% correct |
| Peer-reviewed journals | 4% correct | 17% correct |

The results of the post-test find that although there was moderate improvement in student information skills development, there are still challenges ahead. Transition to university can be difficult for many students. It is evident through the pre-experience survey results that students do not generally come ready with skills for scholarly information seeking. Guiding students on a “continuum of cohesive experiences” is considered important in tertiary settings, especially at the critical time of first year (Burnett 2007, p. 23). The outcomes of the post-experience survey highlighted that opportunities for reinforcement and practice are beneficial and facilitate deep learning. Having information literacy skills embedded in first semester and followed up by a second semester subject would support this view to create a good basis for building on skills over the first and further years.

Use of the library services and resources

A number of aspects were evaluated relating to the use of library services and resources; those being examined here are usability testing and feedback about the online information literacy modules and library discussion board in the LMS.

Usability testing

Usability testing of the modules was conducted during May-June 2009. Usage and general feedback about the modules was also considered. Statistics on the use of the modules for 2009 show 13,155 hits in total¹¹ (Jan – end Oct 2009) and indicate substantial hits on particular modules (ranging from 857-1793). Usage peaked in March when the semester began and May when the Information Literacy Quiz was conducted. Those modules with the highest statistics were *Referencing with APA style*; *Finding items on a resource list*; and *Finding journal articles by topic*, all of which had embedded links in unit materials. The *Can't I just Google?* module was the next highest. The statistics provide evidence that embedding specific links in LMS unit materials to modules, positively affects usage. Although there were specific embedded links in unit materials, some students may not have been able to find them as evidenced by this comment from the student post-experience survey run September 7-14 2009. ***“Modules I did use were extremely helpful, easy to follow, and really helped my research techniques. Fantastic. It would be good if there was more info about them and they were easier to find so I could have utilized them earlier”***

¹¹ Modules are available from the Library website and the hits may not all have been CFY students

Feedback was sought about the usefulness of the modules. 78% of participants gave positive feedback about the modules in terms of usefulness, helpfulness, design, content, multimedia and language and practice exercises. 20%¹² gave feedback that navigation, design and promotion of the modules in workshops could be improved. When asked what worked well in terms of the *Can't I just Google?* video, a majority found the video “appropriate” and “easy to understand”. In addition, in the Library survey of Faculty of Health Sciences staff’s experiences of library support to CFY, 66.7% (10 of 15) of respondents rated the statement: **“The online information literacy modules were useful for teaching necessary skills to students”** either strongly agree or agree. 14-26 October 2009.

Usability testing revealed that the modules were moderately effective in assisting students to achieve success with a task. Labelling and design of modules led a majority of participants to an appropriate module (71%) and pathway (67%), however applying the module guidance successfully was evident in just over half the participants (57%) for one step actions, and less effective in more complex actions (27%), like choosing and accessing a journal database for a topic search. Results show that pathways within the modules could be improved; however, the successful use of internal links to the following page was a positive finding. Visuals and multimedia content were well received by the participants, indicating that enhanced and increased use of multimedia objects would be well received. Specific data on what aspects appeared to work or not, and the frequency and severity of issues which evidently affected achievement for participants, has been explained in the full usability report (Corbin and Karasmanis, 2009), and will inform the review and improvement for 2010 to increase engagement and effectiveness for students.

Table 2: **Student Responses as ‘Most Useful’ (1-2) to the Information Literacy Modules Usefulness question (Likert Scale 1-4) (Fisch et al 2009b, p.16)**

| | | |
|--|------------|-------|
| Can't I just Google? | 330 | 33.5% |
| Finding items on a resource list | 442 | 45.9% |
| Referencing with APA | 707 | 71.7% |
| Finding books, AV and more by topic | 466 | 47.3% |
| Finding journal articles by topic | 501 | 50.9% |
| Finding credible internet information | 481 | 48.9% |
| Finding media reports and newspaper articles | 469 | 47.7% |
| Finding health and social statistics | 404 | 41.1% |

Library discussion boards in the Learning Management System

To enhance the information literacy program, a library discussion board was implemented and monitored in the LMS¹³ in semester two. Between August and November 2009, 114 library-

¹² 2% of feedback was neutral

¹³ In four LMS sections of HLT1IPB

related queries were posted (67% of a total 169 postings). Analysis of the discussion threads revealed that participation in these discussions is a key contributor to promoting a sense of community and cooperation amongst users relating to library matters. Almost all of the discussion threads initiated by students, elicited a response or started a discussion between more than two people. The most frequent topics of the discussions included queries on finding information on a topic, finding journal articles, referencing and citation style. The postings and threads, a number of which were answered by students helping each other and which can be seen by all enrolled within a subject section, indicate a well used service that would be of benefit earlier in future years and has been implemented in semester one in 2010. A student comment sums up the benefit of the Library discussion boards: ***“Great information and now I have a much clearer understanding of how I can access information through the database”*** - Student comment after being assisted on the library discussion board within the LMS of a first year unit, for assistance with finding journal articles. 26 August 2009 11:11 AM, Library Discussions Board, Section A, HLT1IPB.

Stakeholder feedback

Staff and students in the Faculty of Health Sciences were given the opportunity to provide feedback about the impact of the Library’s contribution to the common first year. A common thread throughout all of the feedback was the suggestion to promote the Library’s information literacy modules and other support more widely. Feedback from students was elicited via usability testing, pre and post-experience survey responses and comments, and the library discussion board in semester two. In summary, there were a mixture of positive and negative comments, and suggestions for future improvements. Comments ranged from “difficult to access”, “didn’t know they were available” and “I don’t have time to invest”; to “very useful for doing health sciences research”; “were easy to use” and “really helped my research techniques”. ***“I am able to effectively use the Library catalogue to find electronic resources”*** - 69% (737) of respondents in the student post-experience survey rated this statement either strongly agree or agree. A number of students commented that finding journal articles was “too complex and difficult” and there were suggestions that “the library has good material but further knowledge to find the material needs to be shown to everyone”.

In order to gain a picture of Faculty staff experience of the Library’s involvement in the common first year, an online survey for Faculty staff was conducted between the 14 and 26 October 2009. Fifteen staff members completed the online survey, which consisted of Likert scale statements and open-ended questions. The majority of responses (13 of 15) were very positive overall. Staff were overwhelming positive about the Library/Faculty interaction citing in particular information literacy online assistance, electronic resources, communication and responsiveness to student needs. ***“The library staff responded well to the needs of CFY students”*** - 78.6% (11 of 15) of respondents in the Library survey of Faculty of Health Sciences staff’s experiences of library support to the common first year, rated this statement either **strongly agree** or **agree**. 14-26 October 2009.

“The information literacy information is excellent” – a comment representing several comments in relation to ‘What worked well’ question in the Library survey of Faculty of Health Sciences staff’s experiences of library support to CFY. 14-26 October 2009. Responses to ‘In your experience....What could be improved...’ included the following: librarians present at lectures; library workshops for facilitators and students; and consistency in LMS sites to promote library help. It is clear by this statement ***“Make them take advantage of what you offer!”*** that further explicit promotion of library support would be

beneficial. Although there was positive feedback about the program, there is still room for further refinement, which has become the focus for planning in 2010.

Conclusion

In 2009, in response to a curriculum reform in the Faculty of Health Sciences at La Trobe University, the Library re-developed its information literacy program for first year students. An evaluation of the program and services designed for this cohort indicate that a significant contribution has been made to the foundation development of students' scholarly information seeking skills.

To promote deep learning of the scholarly information seeking process there is a need for continual guidance and reinforcement. Throughout 2009, as the data from the evaluation emerged, changes were made to the library support practice. Evidence from the initial pre-experience survey and usability testing directly influenced improvements to the modules and the establishment of a library discussion board. Students commencing first year in 2010 will benefit from the evaluation activities' findings and recommendations, which have now been implemented. Stronger marketing of a number of aspects of library support emerged across the data and have translated into explicit promotion of library support at orientation. A business card has been created with a link to the modules on one side, and an advertisement for the library discussion board on the verso. A review of the modules was undertaken in the light of the usability testing and other data, and changes have been implemented. The embedding of information literacy in the cornerstone subject has been further refined by Faculty by assigning particular modules for the students to review week by week before the Faculty workshops. The quiz questions were reviewed, and as a result of analysis, the Faculty has decided to make the quiz worth 10% of the cornerstone subject in 2010, with only one attempt allowed.

Outcomes from the evaluation also fed into a deliberate program in 2010 for those students who had been part of the 2009 first year cohort. A specific face-to-face teaching program has been developed to build on the information literacy achievements of the first year, with the focus on finding the best evidence to support clinical practice in health sciences disciplines in this subsequent year. It will be interesting to monitor the impact of the changes on the students from 2009, and the incoming cohort of first year students in 2010, as both groups progress on their continuum of skill development toward graduation and beyond.

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Acknowledgements

Fellow Library Health Sciences Evaluation Working Group members: Eva Fisch, Fiona Salisbury, Claire Brooks and Chris Wanklyn. Faculty of Health Sciences staff: Associate Professor Kerry Fitzmaurice, Matthew Oates, Dr Iain McAlpine and Dianne Williamson. Professor Tom Angelo from the La Trobe University CTLC (Curriculum Teaching & Learning Centre).