

Australian Academic & Research Libraries

Information Literacy at University: A Toolkit for Readiness and Measuring Impact

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To cite this article: Heather Hulett , Jenny Corbin , Sharon Karasmanis , Tracy Robertson , Fiona Salisbury & Tai Peseta (2013) Information Literacy at University: A Toolkit for Readiness and Measuring Impact, Australian Academic & Research Libraries, 44:3, 151-162, DOI: [10.1080/00048623.2013.813372](https://doi.org/10.1080/00048623.2013.813372)

To link to this article: <http://dx.doi.org/10.1080/00048623.2013.813372>

La Trobe University Library has embarked on an institution-wide project with the objective of enabling students to engage with scholarly and credible information from the first year. This initiative by the library is in response to La Trobe curriculum reform. In particular, it aligns information literacy with the inquiry/research graduate capability at an institutional level. Outcomes of the project have resulted in a new La Trobe model for embedding information literacy, a toolkit, and significant changes in practice in areas of the curriculum where inquiry/research is mapped. As a result academic staff have noted improved student performance and academic research readiness.

Keywords: information literacy; information skills; research skills; first year; toolkit; diagnostic; university; higher education; library

Introduction

How do we best help students engage with information literacy at university? How do students recognise their existing information skills, and those required to find and use scholarly and credible information? Probing for prior knowledge and “building on what students already know” can engage, increase motivation and encourage deep learning (Biggs and Tang 2011, 27). Recognising prior knowledge is therefore critical for librarians involved in first year information literacy programmes. It is also a useful starting point for librarians embarking on developing a university-wide strategy for building student information literacy skills from the first to final year. For librarians at La Trobe University, understanding prior information literacy knowledge was a key aspect in responding to university-wide curriculum reform.

The purpose of this paper is to describe a long-term project to embed information literacy in the curriculum at an institutional level. This paper outlines the strategic shift that has occurred at La Trobe University (La Trobe) as a result of explicitly positioning information literacy within the university’s ‘inquiry/research’ graduate capability. The paper first describes the impetus for change, stemming from university-wide curriculum reform. Second, it documents the new La Trobe model for embedding information literacy (IL) in the curriculum, encapsulated in the La Trobe Inquiry/Research Toolkit. Third, it provides an overview of the evaluation project that reviewed the practical application and impact of the new model and considers related resources from the perspective of academic staff. In conclusion, the paper notes achievements, challenges and next steps for information literacy development at La Trobe.

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Background

In 2008 La Trobe University began a process of reviewing and renewing the undergraduate curriculum; adopting six graduate capabilities of writing, speaking, teamwork, inquiry/research, critical thinking and creative problem solving. This provided the library with an opportunity to reinforce information literacy as an essential building block supporting the inquiry/research graduate capability within the university curriculum (La Trobe University 2009).

La Trobe investigation into information skill level of students

A deep learning approach to information literacy can be encouraged if students have an opportunity to recognise what they know and need to know, build basic generic skills, and apply practice of skills in their discipline context . . . Students need support and guidance to build capacity to find, evaluate and use scholarly information (La Trobe University Library 2011a).

Research conducted by the library in 2009 measured the entry-level skills of first year students in health sciences across five La Trobe campuses. The research included a pre and post-experience survey, using a questionnaire of 20 items (Fisch et al. 2009, 48–56) based on the work by Mittermeyer (2005, 227–232). The survey questions provided data on educational background, previous information skills training, library expectations and information seeking preferences of students. The questionnaire also tested basic threshold skills relating to search strategy, document types, search tools, and understanding of scholarly information, for example peer-reviewed articles and interpreting bibliographic citations. Library learning activities, via online tutorials, and a mid-year quiz were completed by students prior to post-testing. The post-testing phase indicated improvements in awareness of information skills, demonstrated by an increase in the mean t-test scores from pre- to post-test for a particular set of questions. However, the increases in correct responses to questions such as the best search tools for finding scholarly journal articles (11% to 25% correct) and recognising citations (23% to 58% correct), suggested there was room for further learning. The overall findings concluded that there was a continued need for reinforcement of information literacy skills in order to promote deep learning of the scholarly information seeking process (Fisch et al. 2009).

The research results demonstrated that students brought a variety of information skills to university but needed practise to strengthen and develop their existing skills. This information further strengthened the resolve of the library to develop an equitable way of providing new incoming students with an awareness of their information skill level in relation to inquiry/research with ongoing scaffolding and practise to build skills.

In 2010, the library gained internal La Trobe funding for a project entitled Information literacy inquiry/research success indicators: increasing readiness and awareness of first year students (IL I/R Success). The rationale for this project was based on the library's 2009 research results. It also addressed the university's recommendations related to developing self-tutoring diagnostic tools (preferably online) for first year students' skills and knowledge, aligned with the six university graduate capabilities.

The core online diagnostic tool developed was the Inquiry/Research Quiz (IRQ). The IRQ is a multiple-choice, self-checked 10-question quiz; with student answers triggering tailored verbal responses (correct or incorrect versions) from animated avatars. There are online tutorials as follow up for students who require more assistance. The quiz is designed to inform first year students about key foundation information literacy skills and provide students with online feedback about their own skills to increase awareness and readiness.

Information literacy policy (IL Policy) and procedure (IL Procedure)

Underpinning the IL I/R Success project is the La Trobe Library Information Literacy (IL) Policy and Information Literacy (IL) Procedure. Accepted as university policy (a major achievement for the library) the IL Procedure includes the Information Literacy (IL) Framework (La Trobe University 2011a, 2011b, 2011c; Salisbury and Sheridan 2011). The framework component identifies intended learning outcomes (ILOs) related to the fundamental skills essential for successful academic research at various levels of capability for university students. The IRQ questions are primarily drawn from the first or foundation capability level ILOs in the framework.

Information literacy skills are further developed throughout the undergraduate and postgraduate years in a discipline-specific context, in collaboration with academic and other learning and teaching staff. This is supplemented by optional library training and support programmes, which students may access as needed.

Literature review

Previous research that assesses the IL skills of commencing students has been undertaken for a number of reasons. One aim has been to identify and address gaps or weaknesses via information literacy training or resources (Conway 2011; Mittermeyer 2005; Thirion and Pochet 2009). Stubbings and Franklin (2005) mentioned a desire to address overconfidence in students who still need IL classes/online instruction. Other documented reasons have been to enable IL training policy to be designed or changed (Thirion and Pochet 2009), and to provide evidence for institutional support for the integration of IL into the curriculum (Mittermeyer 2005). Benchmarking against other institutions is a further factor mentioned in the discussions about why beginning IL skills are measured (Mittermeyer 2005; Thirion and Pochet 2009). In addition, Webber (2006) comments on the potential value gained from pre-tests, where students have the opportunity to reflect on the outcome.

There is general agreement that students come with some, but not all of the IL skills they require to succeed at university (Beheshti 2012; Ellis and Salisbury 2004; Orme 2008; Salisbury and Karasmanis 2011). Seeking to explore the IL skills of new students was a multi-institutional (15 higher education institutions) study undertaken in Quebec in 2002 by Mittermeyer and Quirion (Mittermeyer 2005), which posted a pre-test questionnaire to students prior to their course start date. Five themes were included: concept identification, search strategy, document types, search tools and use of results. Overall the survey outcomes supported librarians' anecdotal observations that students enter university with little knowledge of certain areas, for example scholarly journal characteristics, the role of boolean operators, keyword identification, and aspects relating to the library catalogue. The same Mittermeyer and Quirion survey, or derivatives of it, have been utilised in other contexts and countries (Bernath and Jenkin 2006; Conway 2011; Salisbury and Karasmanis 2011; Stubbings and Franklin 2005; Thirion and Pochet 2009).

In 2006, a survey (based on the Mittermeyer and Quirion questions) conducted at 31 higher education institutions in Belgium showed that information literacy training is critical in order for students to perform at the expected level in higher education. Search strategies, use of results and critical evaluation of information were found to be the most challenging aspects for students (Thirion and Pochet 2009). A pre-test survey in Loughborough (UK) (Stubbings and Franklin 2005) utilised questions from a number of sources including Mittermeyer and Quirion, to develop a local formative checklist and information literacy test that could be used either as self-diagnostic tools or by lecturers for assessment. This issue of self-reflection was central to the Loughborough study in that, "The project team felt that checklists could provide active engagement with the content of the learning material as the tools helps the student to reflect on 'What's in it for me?' . . . Students were genuinely surprised regarding their competence level" (Stubbings and Franklin 2005, 96). To

facilitate this 'reflection', Stubbings and Franklin (2005) utilised online formative feedback for each question and both summative and formative feedback at the end of the assessments, with correct answers and links to further support materials.

Development of IL diagnostic tools, investigation and assessment of student skills, and IL programme design usually involves reference to national, regional or institutional frameworks or graduate attributes (Webber 2006). Parallel to discussions about frameworks and embedded information literacy programmes are the theoretical approaches, like constructive alignment, that explicitly link subject/course learning outcomes and learning activities and assessment tasks (Biggs and Tang 2011; Bruce 2001), as well as attempts to adopt these approaches (Salisbury, Yager and Kirkman 2012). Given the numerous options to integrate IL into the curriculum (Brasley 2008), there are decisions to make about which elements would achieve the desired outcomes and whether generic or discipline specific programmes are appropriate (Anderson 2009; Manuel 2004). A combination of the two can be both scalable and constructively aligned. For example, Borrelli, Johnson and Cummings (2009) created an online space for activities related to an assignment, including generic tutorials, quizzes with feedback, and discipline-specific graded assessment activities. It is apparent that students respond positively to being offered sufficient opportunities to transfer learned generic IL concepts to the practical needs of assignments (Borrelli, Johnson and Cummings 2009; Johnston 2010), and the ability to "practice learning in a given context" (Kenney 2012, 4) has shown improved learner experiences.

Utilising opportunities which arise from an institution's restructure in learning and teaching has been identified as an effective strategy to achieve sustainable IL programmes (McGuinness 2007). At La Trobe, curriculum reform triggered a reassessment of the existing IL approach, an investigation of students' prior knowledge and skills, and the development of IL resources which encourage students to recognise gaps, underpinned by a university graduate attribute and an IL framework.

La Trobe model for embedding information literacy

The La Trobe model has three complementary components. These provide students with: diagnosis and feedback of their commencing IL skills; generic practice to build on existing skills; and discipline specific practice to refine skills. Online resources are central to the model, with two key resources, the Inquiry/Research Quiz (IRQ) and LibSkills (La Trobe University Library 2011a, 2011b), developed by the library to support the model. These resource components aim to:

- alert commencing students to what information literacy skills they need to know (IRQ); and
- enable students to build on what they know and further develop information skills (LibSkills).

The IRQ and LibSkills relate to the IL framework and focus on learning outcomes in five of the six information literacy standards at the 'foundation' capability level:

- Standard 1: recognises the need for information and determines the nature and extent of the information needed.
- Standard 2: finds needed information effectively and efficiently.
- Standard 3: critically evaluates information and the information-seeking process.
- Standard 4: manages information, collected and generated.
- Standard 6: uses information with understanding and acknowledges cultural, ethical, economic, legal and social issues in the use of information (La Trobe University 2011b).

The IRQ and LibSkills aim to increase readiness to learn information literacy skills and are part of a broader strategy and model, which encompass discipline-specific inquiry/research activities. The

advantage of this model is its flexibility; it can be tailored to the requirements of each subject. The model allows subject coordinators to include inquiry/research in the curriculum with a baseline common to the university regardless of discipline, but with practice and assessment tailored to individual subject outcomes. Options for embedding these resources into the curriculum are provided for academic staff as “examples of practice” (La Trobe University Library 2011a). The IRQ and LibSkills can be set up to suit the arrangements in a particular subject. For example, there is flexibility in when they are inserted in a study period, if they are to be completed in class or set for homework, whether they are graded or ungraded, attempted once or multiple times, or set as a voluntary or hurdle task.

Inquiry/Research Quiz (IRQ)

The IRQ is a multiple-choice online quiz and is based on a student-centred approach, as distinct from traditional approaches where students complete modules and quizzes in a pre-defined order regardless of their existing skills. The IRQ alerts students to their existing skills and gives feedback, preparing them for more discipline-specific tasks that are embedded in the first year curriculum in each faculty by academic staff.

The IRQ comprises 10 questions related to finding, evaluating and using scholarly and credible information. Delivered within the Learning Management System (LMS), the questions align with the foundation level capability of the IL Framework (La Trobe University Library 2011b, 2–3). This quiz is unique in that each student’s answer prompts a 3D animated video response in which an avatar-like character simulates an educator/instructor/librarian. Pedagogical agent technology software is used to enable this response (CodeBaby 2012). A correct answer prompts a response that affirms why the answer is correct and provides a link to a LibSkills module for further knowledge extension. This allows the student to build on prior knowledge or learn new information. An incorrect answer prompts a response that explains why it is not quite right, and the correct answer is given with links to a LibSkills module to learn more. The students are not expected to know the answers at the time they commence their university study, which may be as school leaver or at a mature-age point. Both responses raise awareness of knowledge and skills required for university study at a beginning level. For example, in a question about the types of references students might find on an academic reading list, video responses outline the unique features of each type of citation (Figure 1). The link to further information (pointing to a specific LibSkills module about reading lists) alerts the student to “what a citation is”, about “recognising references” and hints on finding them.

Some questions involve a level of thinking that may assist students to work towards the development of skills they will need, such as being able to choose the appropriate search tools for a task, or evaluate sources. An example is a question about searching for information on the Internet (Figure 2). In the quiz response, an avatar talks about what signs to look for when assessing the quality of the information. Further information goes to a module about evaluating information to help the student build skills in that area.

Which one of the following references refers to a journal article?

Choose one answer.

- ☐ a. Martin, H. (2010). Workplace climate and peer support as determinants of training transfer. *Human Resource Development Quarterly*, 21(1), 86-104.
- ☒ b. Denhardt, R., Denhardt, J., & Aristigueta, M. (2009). *Managing human behaviour in public and non-profit organizations* (2nd ed.). Los Angeles: SAGE Publications. ✖
- ☐ c. Pilbeam, S. (2009). Rewarding people at work. In S. Gilmore & S. Williams (Eds.), *Human Resources Management* (pp. 168-192). Oxford: Oxford University Press.



Reference 1: Journal article

Martin, H. (2010). Workplace climate and peer support as determinants of training transfer. *Human Resource Development Quarterly*, 21(1), 87-104.

Reference 2: Book

Denhardt, R., Denhardt, J., & Anisagueta, M. (2009). *Managing human behavior in public and nonprofit organizations* (2nd ed.). Los Angeles: SAGE Publications.

Reference 3: Book Chapter

Pilbeam, S. (2009). Rewarding people at work. In S. Gilmore & S. Williams (Eds.), *Human Resources Management* (pp. 168-192). Oxford: Oxford University Press.

To learn how to identify references do the [LibSkills reading list module](#).

Figure 1. Quiz question and response about types of references

The IRQ can be set up in a variety of ways so that the answers can be provided immediately after each response or at the end of the quiz and subject coordinators can program the IRQ for single or multiple attempts. As a formative tool, the students might attempt it once, get feedback, and then attempt it again. A mark out of 10 can be recorded so that students, who achieved less than the agreed benchmark, are directed to enrol in appropriate training sessions or to complete additional online modules.

What is the MOST IMPORTANT consideration when searching for information on the internet?

Choose one answer.

- ☐ a. accessibility
- ☒ b. credibility ✓
- ☐ c. currency



Figure 2. Quiz question and response about searching the Internet.

LibSkills modules

The LibSkills modules (La Trobe University Library 2012a) are a set of generic online information literacy modules consisting of text, interactive demonstrations and learning activities. The existence of this type of resource is commonplace in university libraries. The unique aspect of the modules at La Trobe is the way they are utilised within the IRQ as an instructional scaffolding tool. The modules extend knowledge required to a deeper point beyond the video response in the IRQ, in order to reinforce, familiarise and enable practice. The self-paced modules vary in length and provide instructions/guidelines for the specific library research skill in the IRQ. Most modules provide practice examples to further develop skills and understanding. Within the IRQ, links to the modules are directed to the relevant information, but the student also has the opportunity to review the whole module in sequence. Outside the IRQ, students can return to the modules at any time to refresh skills, or academic staff can link to relevant modules within subject learning materials (in LMS) as suggested activities.

Practice in the discipline

Faculty librarians collaborate with academic staff in the various faculty disciplines to further embed information skills and provide the practice required to deepen skill level. The IRQ, IL Framework and LibSkills enable academic staff and librarians to collaborate on a selection of activities, assessments and training to embed relevant and targeted information skills with respect to inquiry/research. Students can then practise what they know with learning activities and assessments within the subject/discipline and gain feedback on their progress. An example of how this works in practice is an education subject in which students were required to complete the IRQ and LibSkills within the first two weeks as a learning activity. Subsequently, the students were required to search for and list two peer-reviewed journal articles that they thought suitable for their major assessment and list them in a particular referencing style; formative feedback was given. A further stage of ungraded formative feedback involved a rubric derived from the La Trobe IL Framework, prior to the submission of a major graded assessment (Yager, Salisbury and Kirkman 2013). Practice in the discipline can take a variety of formats, some of which are highlighted as examples of practice in the Inquiry/Research Toolkit.

The Inquiry/Research Toolkit

The development by the library of an Inquiry/Research Toolkit enables the university teaching community to be fully cognisant with this IL model. The toolkit is mounted on the university website and provides a consistent message for promoting IL understanding. It includes links to the IL Framework, background information, IRQ and examples of practice (learning activities and assessments). This resource enables subject and course coordinators to utilise and tailor the resources as required and link to university learning outcomes for the inquiry/research graduate capability (La Trobe University 2011a).

The toolkit has been created to facilitate conversations between librarians and teaching staff regardless of discipline or campus location. Additions to the toolkit will occur as resources for higher-level learning outcomes are developed.

Evaluation

Project development

It is evident that for IL initiatives to succeed, a series of coordinated stages as well as a broad range of expertise is required. The project involved a team of five academic librarians, an academic member of staff from the Curriculum Teaching and Learning Centre, a web designer, Moodle technical staff and multimedia development staff. The partnership between subject coordinators and faculty librarians was equally critical. Consultation with senior academic staff was considered critical to enable the aim of university-wide acceptance of the IRQ as a beginning awareness tool, within the broader usage of the La Trobe model for embedding information literacy.

Commensurate with new approaches are new challenges. Moodle (University Learning Management System) was implemented at La Trobe in 2011, so a high level of troubleshooting was required by the project team members to meet the pilot implementation deadline for semester one. Also, initially, liaising with individual subject coordinators became a workload issue for faculty librarians, which was improved by the creation of the Inquiry/Research Toolkit. A broad summary of activities which involved project planning, development, piloting and evaluation of survey questions, usability testing, and internal evaluations prior to larger scale implementation of the IRQ, is available in the Appendix to this paper. These activities demonstrate the importance of project funding applications, reports and recommendations, technical aspects and academic collaborations, to engage stakeholders and refine tools to achieve the required outcomes.

Outcomes

When the usage of IRQ and LibSkills was examined for outcomes and impact in practice, it was noted that:

- Completion rate was higher in subjects where the IRQ /LibSkills was a hurdle requirement compared to subjects where it was voluntary.
- Quiz results indicated that with multiple attempts and feedback students can usually answer most questions correctly.
- IRQ is an effective mechanism for raising awareness of threshold skills for inquiry/research and contributes to building confidence (as shown by interview extracts provided below).

Further evaluation of the IRQ and LibSkills resources involved interviews with subject coordinators to discuss how the La Trobe model for embedding information literacy contributed to noticeable improvements in students' inquiry/research skills as evidenced in their academic work. Excerpts from some of the interviews and transcripts are available on the Inquiry/Research Toolkit "Examples of Practice". They include a response from a subject coordinator in psychology, where the IRQ and

LibSkills were integrated with an assessment for writing a critical essay. The IRQ was set as a tutorial activity in pairs.

We set them up and said well this is going to teach you how to reference and this is going to help you find good references for the assessment task . . . The biggest difference in quality . . . as a learning outcome for the students was we didn't see any Wikipedia references in any of the essays . . . and I think that the questions in the quiz actually highlighted to the students what is an appropriate reference, what isn't an appropriate reference and they took that on board (La Trobe University Library 2011a).

In addition to the positive results shown in the students' actual choice of references, the subject coordinator reported a level of confidence in students when choosing appropriate references as evidence to support arguments in their writing.

In a management subject, the IRQ and LibSkills modules were set as a task prior to an assessment for a literature review. The unique arrangement in this subject was that students were given three attempts at the IRQ, which was set as a hurdle requirement. With feedback from relevant LibSkills modules provided after each attempt, students who didn't achieve a score of at least 80% were required to attend a programme of sessions offered by the library. The academic staff member states:

. . . it's a really good educational tool and I think the way that it's been implemented which is that students get three opportunities to reach a score of at least 8/10. If they do that's fine, if they don't they have to attend the workshops . . . the idea of getting students to take the quiz early meant that if they were going to have problems with their second assessment, the literature review, we could pick up those problems and address them through the workshop (La Trobe University Library 2011a).

These examples provide insight into how the IL model enabled academic staff flexibility and allowed a variety of approaches for improved student performance and academic research readiness. The library's Inquiry/Research Toolkit provides a central place to encourage academic staff to add their experiences and promote positive student outcomes of inquiry/research capability to the university community to strengthen information literacy at La Trobe.

Conclusion

In aiming to prepare commencing students for IL success, La Trobe embarked on a project to develop a consistent and coherent university-wide IL model. Curriculum renewal, a ratified La Trobe Information Literacy Policy and Procedure, and a La Trobe pre-test of IL skills, provided the architecture on which to build and investigate a new approach for embedding IL skill development in the first year curriculum. The project's tangible outcomes were brought together in the Inquiry/Research Toolkit. Learning outcomes threaded through curriculum in all faculties are numerous and varied due to the tools' flexibility in a range of individual subject designs. Through collaboration between learning and teaching staff and faculty librarians, the new resources enabled the integration of IL skills into first year subject design where inquiry/research is mapped. The strength of the model is that the resources are generic, allow practise prior to formal assessment and can be followed by discipline-specific tasks and assignments to encourage deep learning at the beginning inquiry/research stage.

To enhance and complete the La Trobe model for embedding information literacy, further work is planned. The review of both questions and responses will be ongoing, and additional evaluation of the model's impact on students' academic success is central to future developments. Consideration is being given to clarifying and supplementing responses about filling knowledge gaps on completion of the IRQ, and the addition of challenging enrichment options. A further project is planned for the

development of a tool that can be used at capstone level and align with the higher levels of the IL Framework (consolidating and proficient). This proposed addition to the Inquiry/Research Toolkit would provide academic staff with a resource for final year students to assess their achievements in this graduate capability.

At La Trobe University student readiness for IL success begins at first year with a cycle of diagnostic, feedback and assessment activities that are constructively aligned in subject design. It is a foundation that leads students to build on skills during their course, and then begin to utilise their skills in their professional roles beyond university.

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Appendix: Summary of information literacy development

2010

- Project planning – project application: Information Literacy Inquiry Research Success Indicators: Increasing Readiness and Awareness of First Year Students; environmental scan/literature review of IL diagnostic tests, multiple choice question reliability (Haladyna, 2004); Alpha test of La Trobe Library's 2009 pre-experience survey questions; IL Framework standards review; funding for 2011 pilot in several subjects and internal evaluation; report and recommendations.
- Technical and other collaborations – IRQ development including: questions and investigation of software; responses scripts; audio recording by CTLC expert staff; audio responses integrated into CodeBaby software by web designer; LibSkills review; development of La Trobe assignment calculator; configuration of quiz file for LMS; integrating questions/responses by CTLC; consultations with faculties, associate deans, academic in each faculty.
- Implementation – Pilot and usability testing of IRQ with a sample of students.

2011/2012

- Technical issues and other collaborations – Development of LTU model: IRQ/LibSkills/practice in discipline; Inquiry/Research Toolkit development by project team and web designer; consultation with associate deans, academic in each faculty to ensure model linked to first year subjects where inquiry/research was mapped at foundation level.
- Implementation – Pilot IRQ/LibSkills Implementation step involved subject coordinators collaborating with librarians to implement the La Trobe model to suit specific students and tasks. The IRQ and LibSkills were embedded in eight first year subjects in 2011. In each faculty subjects were chosen that were considered core and attracted the majority of students. Across eight subjects the IRQ was made available to 5628 students with 3039 students completing the quiz. Improved and larger scale implementation and integration into practice in faculties in 2012.