First year science: when information skills are someone else's business

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Abstract

Introduction

The University of Sydney requires all graduates to possess information skills as part of their graduate attributes (http://www.itl.usyd.edu.au/graduateAttributes/policy.htm). This can only be achieved through a close working relationship between the faculties and the library; it's always someone else's business as well as our own.

Within first year science, information skills development is challenged by:

- lack of compulsory units of study
- absence of a foundation unit
- separate curricula for each school within the faculty
- immediate commencement of subject-based learning
- assumed knowledge of some skills
- inadequate time spent on skills development

The Library provides integrated information skills sessions in some first year science units, but the 3000 plus student cohort may receive this content multiple times or not at all, depending on which units they choose.

Methods

A creative solution was required to systematically engage with the cohort in the priority areas of academic honesty and evaluation of scholarly or non-scholarly research.
Library staff partnered with concerned academic staff to implement a coordinated information skills program across first year science. Pre-existing *iResearch* learning objects (http://sydney.edu.au/library/elearning/index.html) were incorporated into a range of units with large enrolments, and were also trialled in conjunction with the University's new ePortfolio system.

Outcomes

Four schools in the Faculty of Science made the **Plagiarism and Academic Honesty** and **Scholarly versus Non-Scholarly** learning objects compulsory components of their first year assessment program. Because of large numbers of enrolments and overlap between first year science units, virtually every student completed the required online information skills content. We added certificates of completion to the learning objects as evidence of graduate attribute development.

Conclusions

Partnerships with unit of study coordinators were essential to complete the project. The use of online learning technology was particularly effective for a large cohort, facilitating the development of information skills outside of the traditional face-to-face classroom context. The end result was a sustainable, low-cost information skills model for first year science. This model could be applied to other faculties and universities, effectively streamlining and sharing the development of information skills.

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Introduction

One of the drivers of learning and teaching at the University of Sydney is the development of graduate attributes in students. Information literacy is one of the five University of Sydney graduate attributes[1] and the University of Sydney Library partners with faculties to develop this attribute.

The Library is recognised as possessing expert knowledge in this area, but the work can't be done in isolation from the development of academic programs; information skills development is always going to be more effective when initiatives are the product of a close working relationship between faculties and the Library.[2]

The focus of this paper is the Sydney Scientist project, a partnership between the University of Sydney Library and the Faculty of Science. To provide a context for this collaboration, a description of the University environment is required.

Liaison model

The University of Sydney Library maintains its relationships with faculty groups primarily through its faculty liaison librarians. These positions are the front line of library services for clients. They have a dual role – they make the range of services and resources clear and easy to understand for clients, and they communicate information about activities and developments in their client groups to their Library Managers. The Library currently organises its faculty liaison librarians in faculty groupings, with five Science faculty liaison librarians. The Science faculty liaison librarians have always worked closely with their assigned schools, but they have worked somewhat independently of each other. Since the introduction of a Science Library Services Team Leader position to manage them, their activities have been coordinated more effectively. Moreover, the Science Library Services Team Leader's appointment to Faculty committees resulted in further significant change. For the first time the Library was consistently represented in high level Faculty of Science discussions; previously representation was usually at the school level. This new level of representation has facilitated the development of project collaborations at the Faculty level.

Information literacy and the Faculty of Science

The Faculty of Science is comprised of the following unit and schools:

- Unit for the History and Philosophy of Science
- School of Biological Sciences
- School of Chemistry
- School of Geosciences
- School of Mathematics and Statistics
- School of Molecular Bioscience
- School of Physics
- School of Psychology

First year students undertaking one of the five Faculty of Science degrees may enrol in units of study in any of the schools listed above. The schools, however, function largely independently of each other. There is no foundation unit of study, and there are no compulsory units of study. Students immediately commence discipline-specific learning in each subject area, and the curricula for each school are completely separate.

Unit of study coordinators often assume student proficiency in a range of skills and inadequate time is spent on academic skills development. Students, however, are often lacking these skills and come to the Library seeking assistance. In addition, widening participation (social inclusion) initiatives increase the likelihood of academic skill gaps in new student cohorts.[3] Therefore, there is a wide range of student expectations and skill levels at play in this context.

Since school curricula in the Faculty of Science are developed independently and the students have a large degree of freedom in choosing which units of study to enrol, some academic skills end up being taught either multiple times or not at all. This is particularly true of information skills; some units of study have integrated information skills programs, and some have none.

As there is no foundation unit, there is no means of capturing all of the students at one point in their program to address this problem. The situation is also complicated by the fact that the student cohort is comprised of over 3,000 students. Neither the Faculty nor the Library has the resources to administrate a series of embedded face-to-face classes or online content to a cohort of this size, so these are not sustainable options.

Information skills in the literature

Embedding information skills in undergraduate programs has been described as "an aspiration rather than a fully realized ideal."[4] There is a trend for information skills development to go from an isolated component to a unique set of skills and cognitive abilities integrated with academic content.[5]

Many librarians acknowledge that the faculty is the most important component of new information skills programs,[6] and that "faculty should be educated about what information literacy is and what it is not."[7] It has been noted that the first year experience is a special category and requires a different approach to information literacy. The current generation of students are comfortable with technology and don't acknowledge that they have anything to learn. To change their perspective requires "a complete culture change."[8] This requires involvement by all relevant parties. Kift describes the first year experience as "everybody's business",[9] demonstrated to good effect in the development of a virtual learning environment at the University of Southern Queensland.[10]

Some libraries partner with faculties to offer online information literacy programs as part of an existing unit of study. The information literacy module becomes a compulsory component of the student's coursework. An example of this is the "ARTS1000: eSearch to Research" collaboration between the Library and the Faculty of Arts at the University of Sydney.[11] Other libraries implement solutions at the institutional level; the University of New South Wales Library gained agreement with the Academic Board to embed their "Enabling Library and Information Skills for Everyone" online tutorial for 10,000 beginning students.[12]

The literature suggests that unless there is some way to make participation compulsory, students attending information skills programs tend to be high achieving students.[13] At the University of Sydney, there is no foundation unit at the institutional level or at the Faculty of Science level, so there is no scope for embedding information skills in either of these contexts. In order to integrate and embed information skills content across first year Science units, a creative solution was required to systematically engage with the entire cohort.

Methods

Project formation

Prior to the creation of the Sydney Scientist project, interested Library and Faculty staff had discussed the areas of student knowledge that are consistently missing in first year students. They singled out plagiarism and academic honesty, and the ability to evaluate resources for scholarly merit as the main areas of difference between the skills expected in higher education and the skills expected in secondary education.[14] Faculty staff were also concerned with graduate attribute development in a range of other areas: first year student experience, students' attitudes to and reflection on their development as scientists, and their perception of the cohesiveness of their first year program.

We agreed that extra staff resources would be required to address these gaps, and an application was made for Teaching Improvement Project grant funding[15] to initiate the Sydney Scientist project. The project members were the Science Library Services Team Leader, the Faculty of Science Associate Dean of Learning and Teaching, the First Year Coordinator for the School of Chemistry, and a Project Officer position funded by the grant. The project ran for 18 months, with the project team meeting every 3-4 weeks. The project team was in regular communication with first year Science unit of study coordinators and Science faculty liaison librarians to ensure the outcomes of the project were relevant and targeted.

iResearch

Plagiarism and academic honesty, and the ability to evaluate resources for scholarly merit had previously been addressed by the Library's "iResearch: information skills for life" project (iResearch project).[16] The iResearch project had also been funded by a University of Sydney learning and teaching grant, supplemented by matched funding from the Library. The aim of the project was to create a series of short, fun, reusable online learning objects in core areas of research and information skills development. A learning object has been defined as "an independent and self-standing unit of learning content that is predisposed to reuse in multiple instructional contexts".[17] The iResearch learning objects incorporate a range of commonly used multimedia formats to provide engaging, interactive online learning experiences. A further aim for the iResearch project was to design a framework for the sustainable development of generic information and research skills resources in the Library. This would reduce the need for multiple librarians to "re-invent the wheel" by developing content from scratch or redeveloping existing content. The learning objects are available to students online via the Library's website so they can access them "just in time" at a time or place that suits them. They can also be integrated into information literacy programs.
A team of Library staff designed the content of each learning object, guided by eLearning and interactive design principles, such as the use of scenarios to teach concepts.[18] The teams developed a primary learning goal, a series of learning outcomes, and an initial learning object wireframe. A wireframe is a "content development working tool used by website content developers to plan and conceptualise the content elements of a site. The wireframe does not include design, or aesthetic characteristics. Essentially, a wireframe is a framework of content and navigation to which design stylistics are applied".[19] This was followed by a detailed script. The learning objects were created in Adobe Captivate or Flash, and were rigorously tested by students. Academic and student feedback generated by the user testing was incorporated into the final version.[20]

The "Plagiarism and Academic Honesty" learning object[21] explains the difference between referencing and copying, and the concept of academic honesty. The "Scholarly versus Non-Scholarly" learning object[22] defines a scholarly resource, identifies what type of resources are scholarly, and uses criteria to evaluate Wikipedia, books, magazine articles and peer reviewed journal articles. The Sydney Scientist project group agreed to incorporate the "Plagiarism and Academic Honesty" learning object and "Scholarly versus Non-Scholarly" learning object into a range of first year Science units of study. Units were chosen from four schools in Science with large enrolments: Biological Sciences, Chemistry, Physics and Psychology. Completion of these two learning objects was made a compulsory component of the unit of study assessment programs.

Certificates of completion

One of the goals of the project was to develop a way of monitoring student completion of the two learning objects without generating a large amount of administrative work due to the large cohort. To address this issue, the project team came up with the idea of adding functionality to the learning objects by allowing students to obtain certificates of completion. Once students worked through the learning object they were given the option of clicking on a link to generate a certificate of completion. They were then redirected to a secure website where they entered their unique student login and password, and a PDF certificate of completion was automatically generated. The certificate contains the student's name and number, the name of the learning object completed, and the time and date of the completion. The student can then save the certificate and print it off. Students were encouraged to save their certificates of completion so they would only have to complete the required learning object once, and they could submit the certificate of completion in multiple units as required.

eCommunity

Another goal of the project was the development of an online environment for first year students. The University eLearning department had recently made BlackBoard eCommunity sites available. BlackBoard eCommunity sites are similar to regular BlackBoard sites, but membership is not linked to unit of study enrolment. The sites can be made available to academics and students on an open-ended basis. Use of eCommunity sites has been extremely successful in other Faculty/Library ventures,[23] and it was judged an appropriate resource for this project. The project members agreed that a BlackBoard eCommunity site would be accessible to students if they were enrolled in at least one Science unit of study.

The content of this site was initially divided into the following areas:

- My Degree
- Research and Information Skills
- FAQs

The Library collaborated closely with the Faculty on the content in the Research and Information Skills and My Degree sections.

Outcomes

Certificates of completion

The Sydney Scientist project group's intention was that the development of graduate attributes should not be separated from subject-specific learning, and literature on generic skills development supports this position.[24] Although there is no compulsory unit of study in first year Science, the sizes of the Science units and the large enrolment overlap between the selected first year Science units ensured that virtually every student completed the required learning objects. Thus a minimum level of information literacy development was achieved in the first year cohort.

The certificates of completion were not assigned any marks, but submitting the certificates were requirements for relevant laboratory assessments to be marked. Given the importance of the laboratory classes in these disciplines, this effectively meant that completion was required for passing the units of study. Different schools preferred different submission methods. The unit of study coordinator could require students to attach a hard copy certificate to the cover sheet of their first assignment, while other unit of study coordinators preferred online submission. BlackBoard[25] is used as the institutional learning management system, and students are enrolled in BlackBoard sites for each Science unit of study. BlackBoard has the facility to allow the upload of student assignments; however some unit of study coordinators preferred a solution requiring less administration, so in response the Library created a database of student completion of each learning object. This enabled the download of student completions in spreadsheet format. If the spreadsheet is loaded as a grade column into a BlackBoard unit of study site, it creates entries for the students who are enrolled in that unit, and gives an error message for students not in the unit. This way a unit of study coordinator can easily see which students have yet to complete the learning objects, and they can then follow up with these students to ensure completion.

Issues arose over using the learning objects for a purpose they were not originally designed for. The Flash files were designed to allow students to learn at their own pace; they could fast-forward and rewind the learning objects to facilitate revision, and focus on a particular area of learning. Initially the learning objects embedded in the Science curriculum could be fast-forwarded to the end to obtain the certificates of completion. This was promptly addressed, and the fast forward function was disabled (although they could still be rewound for revision purposes). However disabling the fast forward function was an issue for faculty liaison librarians in information literacy classes, particularly if they only wanted to use one section of a learning object. The solution eventually introduced was to create two versions of each learning object – one version providing certificates of completion with the fast forward function, and another version allowing fast forwarding with no certificate of completion available.

An outcome of the Sydney Scientist project was the use of certificates of completion in conjunction with the rollout of the University's new ePortfolio system – PebblePad. PebblePad can be used for student reflective tasks, and as a repository of evidence accumulated by students as they develop graduate attributes.[26] There was support from the University eLearning department to trial this software and evaluate its effectiveness with a small student cohort, and the Faculty chose a small group of Chemistry students for the trial. As part of the trial, they were required to access their "Plagiarism and Academic Honesty" certificate of completion and load it in their ePortfolio as proof of graduate attribute development in information literacy.

eCommunity

The Sydney Scientist project group organised a focus group to obtain student feedback. One of the major changes introduced as a result of this feedback was the development of the First Year Science Roadmap. One of the inspirations for this resource was the Library's First Year Roadmap. The Library's First Year Roadmap was created as part of the iResearch project to link together a range of previously created iResearch learning objects, instructional web pages, and videos.[27] The resources are presented in a visual layout, with lines denoting relational links between the resources to create a visually attractive introduction to the resources available to new students. Feedback from staff, both academic and Library, has been positive about the roadmap, particularly as an introduction for new students to the University's online environment.

The First Year Science Roadmap was similarly presented in a visual layout (Figure 1). It used a DNA helix visual theme, divided into specific weeks, with each DNA strand representing a task or item of knowledge relevant in that week. When students moused over these strands, further explanatory information would appear in pop-up boxes.
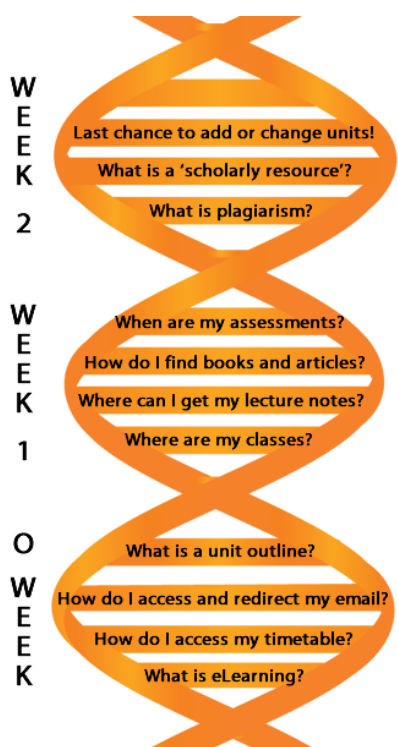

Figure 1 – First Year Science Roadmap. Retrieved from BlackBoard Learn site 12 March 2012.

How do I find books and articles? was included in Week 1, linking to the Library's First Year Roadmap. Links were also provided to:

- The "Find that Book" learning object,[28] which explains the Dewey Classification System, call numbers, and helps students to locate books on Library shelves
- The "Finding Journal Articles Using Databases" learning object,[29] which explains what a library database is, allows students to select appropriate databases for a topic, and search the catalogue to find full text journal articles.

A Week 2 topic was **What is plagiarism?**, which linked to the "Plagiarism and Academic Honesty" learning object, Faculty information, and the official University policy. This section of the Roadmap also reminded students to store a copy of their "Plagiarism and Academic Honesty" certificate of completion in their ePortfolio, reiterating that obtaining the certificate is a requirement of their units of study. Another Week 2 topic was **What is a 'scholarly resource'?** which introduced the concept of scholarly merit, and linked to the "Scholarly versus Non-Scholarly Resources" learning object. Once again students were encouraged to store their certificate of completion in their ePortfolio.

The Roadmap was easily updated to cover different weeks throughout the semester. When the design of the Roadmap was changed to cover weeks 3-5, **How can I improve my research skills?** was added as a Week 5 option. The information box for this option included the links to "Teaching yourself online" (Library videos, podcasts, and online tutorials)[30] and "Library classes on campus".[31] **What is a 'scholarly resource'?** and **How do I find books and articles?** were repeat options in Week 3.

The My Degree section of the eCommunity site included a link to the Faculty's Graduate Attribute statement, and the Faculty and the Library collaborated closely on the rewriting of the Information Literacy statement. This section provided a student login to PebblePad and an explanation of what an ePortfolio can be used for. It also explained how students can commence building their ePortfolio by uploading their "Plagiarism and Academic Honesty" certificate of completion. In the focus group, students liked the PebblePad system but only understood its usefulness once the focus group facilitator explained the concept to them; further evidence that embedding the site in orientation activities would be beneficial. They also suggested it would be a great place to load instructional videos; particularly for laboratory techniques that they master in first year and then forget by the time they need to use them in second year.

Library resources were also heavily integrated into the Research and Information Skills section of the site. This section linked to the Library, Learning Centre, the Library's First Year Roadmap, student survival tips for using the Library, and a link to the Library's Ask a Librarian contact form.

Conclusions

The Sydney Scientist project was the first major partnership between the Library and the Faculty of Science, and it was the first time a Science information skills program was integrated at the Faculty level. The project's success was due to the number of motivated Library and Faculty staff members who worked together to make a substantial and sustainable contribution to academic skills development. The Faculty's Associate Dean for Learning and Teaching, the Learning and Teaching Committee, unit of study coordinators, Science Library Services Team Leader and faculty liaison librarians were all involved. Like others involved in library/university projects, the project members found that collaboration is a "recursive process that requires time and planning."[32]

The adoption of new online learning technology was particularly effective in managing the large student cohort. This technology facilitated the development of information skills outside of the traditional classroom context, and ensured face-to-face class time was not impacted. This made it a particularly attractive option for unit of study coordinators, as a relatively small amount of administrative work was required.

No formal evaluation of graduate attribute development was carried out, as this is constrained by the fact that the student cohort is comprised of over 3,000 students. With a substantial commitment of time from academic coordinators and library staff, creating and maintaining online tools to assess student learning would be possible. But at present this isn't a realistic prospect, as neither the Faculty nor the Library is resourced to absorb this additional administrative work. However some academics have developed their assessments to take into account the prior completion of the learning objects and the development of student knowledge in the areas of plagiarism and academic honesty, and the evaluation of resources for scholarly merit. There is scope for further evaluation, possibly by comparing the current first year cohort to previous cohorts, in terms of the frequency of academic dishonesty cases, and the quality of citations in student work.

The Science Library Services Team Leader has already briefed the Science faculty liaison librarians on their future role. The next step will be for the faculty liaison librarians to utilise their good relationships with their schools to build on what has been achieved in the project, and systematically integrate additional iResearch learning objects and certificates of completion into first year units of study. This work will now be integrated into routine faculty liaison librarian activities.

In the focus group, students had asked for orientation sessions in the use of the eCommunity site. In response to this feedback, the site was integrated into transition and orientation activities for first year Science students, and in the Bachelor of Liberal Arts and Science tutorials. This gave the resource a wider profile, and it was made available to students who may require additional support during their orientation. The introduction of a "one-stop shop" of essential resources for new students will hopefully contribute to the minimisation of at-risk students during first year. Focus group feedback also requested adding exam dates to the First Year Science Roadmap. Additional feedback suggested that students didn't think the eCommunity site felt very much like a 'community' as there is no interaction with others. Participants requested the introduction of a Facebook page, which will be considered for next year.

The site content will be reviewed and revised before it is rolled out to the 2013 first year cohort. The access logs for particular sections of the site will be analysed to determine which pages were the most used. A survey on the site is also being considered, to assess whether the goals of the Sydney Scientist project have been achieved. As the site was successfully used in the transition activities, there have been discussions around more firmly embedding it in other first year units.

The end result of this project was a sustainable, low-cost information skills model for first year science. Although the initial work was funded by a learning and teaching grant, the model can now be incorporated into other Library/academic partnerships. Information about the project was communicated to the other University of Sydney faculty liaison librarians, potentially informing discussions with their faculties.

The iResearch learning objects have a creative commons license, and there have been many requests for the resources from other institutions so they can adapt the learning objects for their own use. The programming code for the certificates of completion could also be made available, allowing this model to be applied to other faculties and universities, effectively streamlining and sharing the development of information skills in a range of contexts.

As this project demonstrates, the successful integration and embedding of information skills in academic programs will always be facilitated through a close working relationship between faculties and the Library; it's always someone else's business as well as our own.

Acknowledgements

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