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Confidence or Competence? – auditing information literacy skills of biology undergraduate students.

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ABSTRACT

During first semester of 2002, Macquarie University Library and Department of Biological Sciences conducted a self-assessment audit of biology undergraduate information literacy skills. A survey asking biology academic staff to identify what information literacy skills they expected students to have entering each year of study was also undertaken. The audit revealed that most first year students felt confident in their ability to find and use information resources and that confidence increased over the semester. Despite this confidence, testing at the end of semester demonstrated that the level of information skills of students still varied greatly. The results of the staff survey also highlighted that the type and level of information skills that students were expected to have varied considerably and often depended upon the specialized needs of unit content.

KEYWORDS

information literacy, generic skills, undergraduate science students, academic libraries.

INTRODUCTION

In most academic institutions, the need to improve student generic skills has risen in importance. This is primarily due to the requirement of DETYA (1999) that university strategic plans must refer to graduate attributes. In order to address this, Macquarie University has developed a list of graduate attributes and a list of generic skills (including information literacy and information technology) that underpin the attributes.

The Council of Australian University Librarians (CAUL, 2001) released a set of seven standards derived from the *US information literacy standards for higher education*. They define information literacy as the ability to see when information is needed and to locate, evaluate and use it effectively and appropriately. Information competencies go beyond library literacy to include, “computer literacy, media literacy, information ethics, critical thinking and communication skills” (Parang et al, 2000, 270).

The Library, in conjunction with the Division of Environmental and Life Sciences, applied for a *Fund for Integrating Generic Skills* grant to assist in the development of instruments that would

investigate information technology and information literacy skills of staff and students. This project was seen as a first step in formulating a structured program for developing information literacy skills in undergraduate science students. The Division identified a large core unit (BIOL114) to be used as a model subject for introduction of this new program. This unit would then serve as a foundation for future developments throughout the Division as the cohort of students feed into a range of science subjects such as biology, chemistry and geology.

PART ONE: NEEDS ANALYSIS OF ACADEMIC STAFF

First year biology unit course co-ordinators were targeted initially as their responses fed into the design of the student audit. A checklist of competencies in both information literacy and information technology was developed and then administered to all of the undergraduate biology course coordinators. The coordinators were requested to comment on the following in relation to the course they were convening:

- general expectations of student ability to perform a range of tasks
- methods of introducing library research to students
- information resources that students were expected to consult
- IT competencies required
- evaluation skills required
- current referrals to existing library workshops
- general opinion of student competencies in a range of areas, such as defining a topic or accessing online journals.

The survey was very successful in giving the library staff a better understanding of the expectations in areas such as reference, catalogue and journal usage. For example, academic staff identified that they expected students to refer to a few texts and one or two core journals in their research for assignments. Library staff had previously directed these first year students to a wide range of online databases resulting in the use of many and varied scholarly journals. In response to the academics advice, the Academic Outreach Librarian for the Division created a guide for the students, *Researching Your Essay*. This guide fed directly into the process of researching for the main assignment. It included instructions in finding articles using one or two databases that index a range of basic life science publications. This information was also passed onto other library staff who could then answer BIOL114 students' research questions more effectively.

LACK OF CLEAR-CUT EXPECTATIONS OF UNDERGRADUATE STUDENTS

It was anticipated that there would be a gradual increase in information literacy skills required across the three undergraduate levels. In reality we discovered that these assumptions cannot be made. The units offered by the Biological Sciences Department vary from molecular analysis to ecological studies, and the information literacy skills required vary according to subject. Furthermore staff reported that the skill level of students within the same course could range from unfamiliarity with basic concepts, such as "review article" to extreme proficiency in locating and retrieving information. Additionally, lab-based students had less emphasis placed upon the development of library research skills and more emphasis on vocational or practical research skills. We did establish however that staff made assumptions on student's ability based on prior units. Many third year academics commented that their students were there to learn "science", and that they should have acquired information literacy skills in earlier units. A clear need is emerging for a coherent departmental approach to information literacy.

PART TWO: SKILLS AUDIT OF FIRST YEAR BIOLOGY STUDENTS

A self-evaluative audit was developed, based on information technology and literacy skills identified by first year course co-ordinators in their checklists and interviews relating to student abilities. It also involved the customising of an Information Technology Basic Skills Inventory, or checklist of core competencies for IT Literacy, developed in 1998 by the Library's Information Technology & Training Unit. The checklist was developed around the CAUL information literacy standards and also drew on other institutions' information literacy assessments and competency lists. The competencies developed by California State University were particularly useful as they arranged information literacy into a more meaningful process focussing on outcomes, "is it really possible to assess definitively statements of desired student skills such as the core competencies ...which contain many variables and are expressed in abstract terms?" (Dunn, 2002, 27).

The audit was initially administered to all students (including external students) in the first week of semester. The students had to score their ability on a range of specific tasks in the following areas:

- Defining a research topic
- Establishing the information requirements for a research question
- Locating and retrieving relevant information
- Using technological tools for accessing information (including computers, web browsers, the Library web site, the Library catalogue, databases and the Internet)
- Evaluating information
- Organising and synthesising information
- Communicating and presenting information
- Understanding the ethical and legal issues surrounding information and information technology
- Judging the product and process

Students scored "yes" if they had the skill, "no" if they did not have the skill or "unsure" if they were uncertain whether they had the skill.

The first audits were returned to students along with suggested training options offered by the Library that matched the students' perceived areas of weaknesses. In some skill areas it was recommended that they should consult their lecturer or tutor as information literacy skill development does not depend solely on the library.

A second audit was administered in the last week of first semester. Because most the students had scored themselves as quite able in the pre-test, it was decided to include five extra multiple choice questions that tested specific skills. These quiz questions were intended to check if the students' confidence reflected their actual competence. The students were also requested to report on any self-help/training strategies they had followed.

HIGH LEVEL OF CONFIDENCE IN THEIR ABILITIES

The students were quite confident in their ability across all standards. With the first audit, an average of 64% of students scored themselves as able to perform most tasks. However, 24.5% of students responded as being "unsure", indicating a certain amount of uncertainty. By the end of the Semester, the average number of students scoring "yes" was 84%, and the "unsure" responses had halved to 12% (Figure 1). The confidence in students' own abilities is a view not shared by the librarians and academic staff. The academic convener of BIOL114 reported that more than half of

the students' references were internet sites, as opposed to monographs or journal articles, and these web sites ranged from authoritative to highly spurious sources. The quiz results also questioned students' confidence in their abilities as less than 55% of them answered each question correctly.

Over confidence in self-assessment surveys is a result observed in other studies of undergraduate information literacy skills such as Information Literacy Survey administered by the teaching library at University of California, Berkeley. Here they found that, "...students think they know more about accessing information and conducting library research than they are able to demonstrate when put to the test" (Maughan 2001). Macklin (2001, 306) also states that the "confidence so many students demonstrate in using technology often creates a barrier between what they really know and what they could learn to sharpen their skills and make their time online more effective".

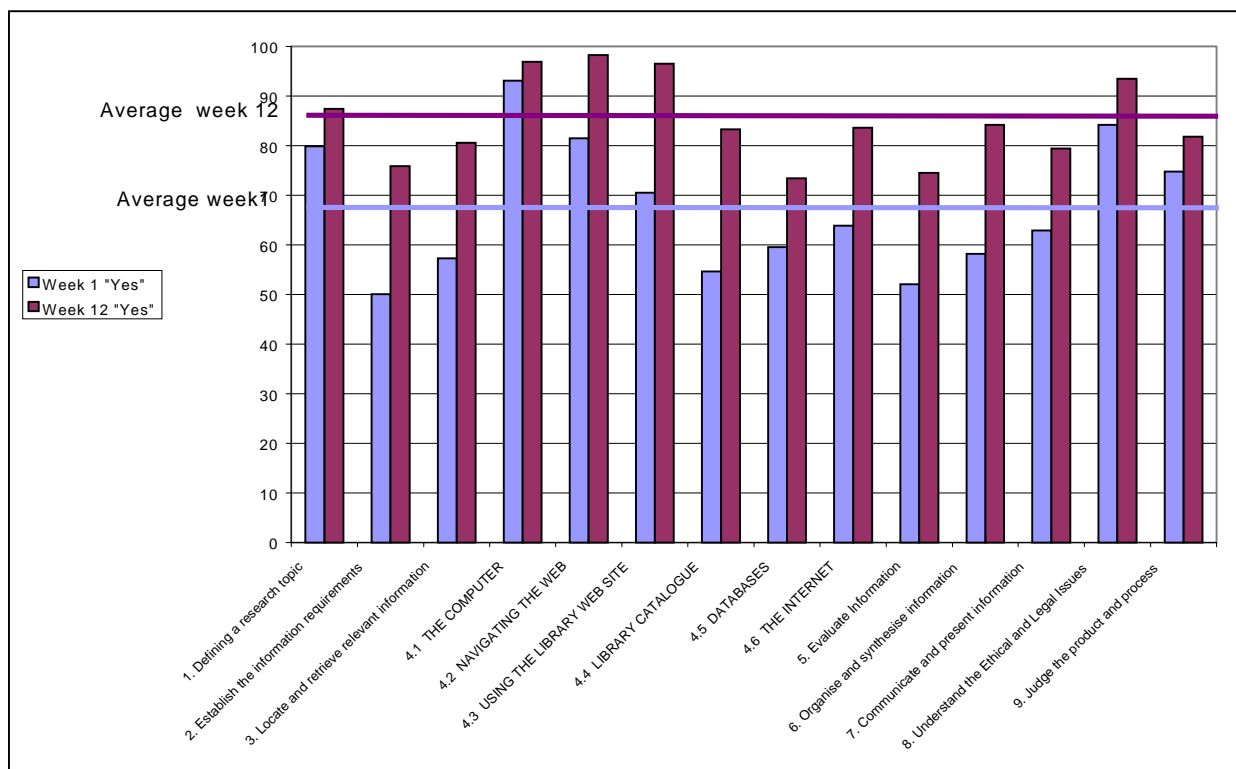


Figure 1: Average percentage of "yes" responses for each category, at week 1 and week 12.

STUDENTS STRENGTHS AND WEAKNESSES

Overall, the students demonstrated a consistently high level of confidence in their ability to use basic information technology tools (computers, browsers, word processing). They also scored themselves competent at the tasks listed under *Defining a Research Topic* and *Understanding Ethical and Legal Issues* (Figure 1). Most of their weaker areas were skills not yet required of them, such as identifying peer reviewed journals, using an online thesaurus and identifying a reputable publisher (Table 1).

Most students could do.	Most students could not (Week 1).	Most students could not (Week 12).
Use the Computer	Identify an abstract	Identify peer reviewed material
Navigate the web	Identify fields in a library database record	Identify if a publisher is reputable

Use an index in a book	Identify peer reviewed material	Use PowerPoint to present ideas
Use dictionaries etc to explore a topic	Locate a fulltext journal on an online service	Locate and use a database thesaurus
Use Word to present an assignment	Identify if a publisher is reputable	Place a hold on an item (Catalogue)

Table 1: Students' assessment of their capabilities (limited to the five tasks most students reported)

PART THREE: CUSTOMISED TRAINING

The Grant proposal initially included the customisation of the Library's online information literacy training package, LIBSonline, for biology students. However, academic staff felt a tailored online course could be more beneficial at a later stage. Instead, the students were presented with a range of training options from which to choose. In addition to the *Researching your essay* guide, students received feedback from the initial audit guiding them to suitable training sessions. These ranged from face-to-face internet and research workshops to generic online training modules (LIBSonline, ITSONline). The librarian also attended the first lecture to give a brief introduction to the services and facilities in Library and students received a range of library brochures.

Finally, the students were requested to indicate where they had *voluntarily* gone for help during the semester. At least half of respondents sought at least one form of assistance. Of these students, 60% went to Library tours, 49% sought help from the Library's Reference desk, and 41% consulted their lecturer about researching/writing their assignment. Besides the tours, which are included in the First Year Orientation program, the majority of help appears to be sought at point of need.

Unfortunately, the number of students reporting to have attended training does not correspond to existing training statistics. Further analysis is required to ascertain if there is any relationship between attendance at training sessions and to improved performance in the audit.

FOCUS GROUPS

We tried unsuccessfully to run a focus group in an attempt to understand how the students had engaged with the audit. We suspected that some of their responses may have resulted from a lack of understanding of the terminology used. We also wanted to find out what motivates students to attend training. The few students who did respond indicated that they were not inspired to attend training as a result of the audit, although they did admit that it made them aware of what they did *not* know.

CONCLUSION

The student audit highlighted the limitations of self-evaluation when trying to measure ability. A student does not always know what he/she doesn't know. Perhaps using a quiz or task would provide a more reliable indication of a student's ability to perform a given skill.

Furthermore, we have learned that academic staff and librarians cannot make assumptions about the skills that students bring with them. The challenge is to find a coordinated approach to developing these skills in all students. The project team also felt that designing, administering and analysing the

audits has highlighted much about the *process* of information literacy and the need to develop information literacy skills into the curriculum in a systematic and structured way.

The Library is currently planning to assist in this process by developing an Information Literacy Framework and a suite of assessment tools that students and staff can use.

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