

Exploring Evidence-Based Information Literacy

Catherine Clark

The University of Western Australia Library

35 Stirling Hwy

Crawley

Western Australia 6009

Ph: +61 8 6488 2327 Fax: +61 8 6488 1139

Email: cclark@library.uwa.edu.au

ABSTRACT

Significant resources are spent in higher education libraries on designing and implementing programmes to ensure that graduates are information literate. An emerging challenge for libraries is to determine how effective these programmes are, and to assess whether the resources supporting them are being well used.

The recent publication of the *Information Skills Survey* (Catts, 2003) has provided an evidence-based test instrument for evaluating law, education and social science students' information literacy skills. However, there is currently no equivalent instrument for the sciences, including medicine.

This paper reports on research conducted with medical students at The University of Western Australia that aimed to validate the *Information Skills Survey* for medical information literacy programmes. Discussion includes the research process and how the implications of the research will affect information literacy programmes in the future.

INTRODUCTION

The central research question for this study was:

"Is the *Information Skills Survey* a valid and reliable instrument for the evaluation of information literacy programmes in a medical course?"

The research objectives were:

1. To assess whether the *Information Skills Survey* is suitable for the purpose of investigating the information literacy levels of a group of students in medicine.
2. If not, to identify the modifications that are necessary to make the *Information Skills Survey* a reliable instrument for investigating the information literacy levels of a group of students in medicine.

BACKGROUND

Information literacy is recognised as one of a range of knowledge, values, skills and understandings that are required for lifelong learning. To become lifelong learners, individuals must have access to needed information, and must also be able to judge the quality of the information to which they are exposed (Candy, 2002).

The identification of the importance of information literacy in lifelong learning has led to a focus on information literacy instruction in the teaching and learning programmes of most university libraries (Marcum, 2002; Orr & Cribb, 2003). University librarians realise that if information literacy is to be acquired, it must be managed using a planned instruction programme (Lupton, 2004).

In universities, this has coincided with the push to include information literacy as part of course curricula, rather than stand-alone sessions run by the library. Many librarians now work closely with faculty staff to ensure that information literacy is included in curricula along with other generic skills, such as communication skills (Bundy, 2004).

New approaches to information literacy have led to a change in allocation of resources within libraries. The emphasis on curricula development has required librarians to work more closely with academic colleagues and put more of their time into liaison and course development. This, combined with the change from content to skills based information skills, has become

a growing source of demand for resources (Gedeon, Radcliff, & O'Connor, 2004; Marcum, 2002; Orr & Cribb, 2003).

Evaluation of the effectiveness of information literacy programmes has not been widespread. While research literature has many examples of excellent information literacy programmes, evaluation has proved more problematic (Palmer & Tucker, 2004). The integration of information literacy programmes within the general faculty curriculum has meant it is difficult to separate the information literacy aspects from the general subject knowledge of the curriculum.

In Australia, the emphasis on information literacy in higher education is evidenced by the publication of two major information literacy works in the last five years. *Information Literacy Standards* (CAUL, 2001) were produced in 2001 by the Council of Australian University Librarians (CAUL) in conjunction with the newly formed Australian and New Zealand Institute for Information Literacy (ANZIIL). This publication was updated in 2004 and published as *Australian and New Zealand Information Literacy Framework* (Bundy, 2004). Both of these publications were designed to guide institutions in developing effective information literacy programmes, thus ensuring information literate graduates.

A search of the literature did not identify any reported evaluations of information literacy programmes for medical students. In medicine, there are as yet few information literacy programmes that run through a full medical course and there has not been a standard tool with which to evaluate any programme that is in place.

The US Institute for Information Literacy prepared a project plan in January 2004 that has as one of its goals "Develop criteria for assessing information literacy programs" (IIL, 2004). In 2003, the Council of Australian University Librarians published the *Information Skills Survey for Assessment of Information Literacy in Higher Education (ISS)* (Catts, 2003). This survey

was designed to address concerns about how we measure students' information literacy skills. The *ISS* was designed and developed by the CAUL Information Literacy Assessment Project Team. The team included librarians from six Australian universities and Dr Ralph Catts as Principal Researcher.

The *ISS* was designed using the *Information Literacy Standards* (CAUL, 2001) and benchmarked with students studying education and law. The project team noted the survey developed with students in education can be used in a range of social science contexts. However, it has been shown that scholars use information differently in different discipline contexts (Candy, 2002; Catts, 2004). The project team recommended that information literacy surveys should be developed for students in other disciplines, including medicine (Catts, 2003). If the *ISS* was found to be valid for medicine, it may also be valid in other science disciplines.

This study was conducted at The University of Western Australia (UWA). The University has an enrolment of approximately 16,000 students in nine faculties. The Bachelor of Medicine and Bachelor of Surgery is a six-year undergraduate programme offering integration of science and clinical teaching. Until 2005, it was the only medical course available in Western Australia. It remains the only undergraduate course in the state. There are approximately 140 students in each year of the course.

The UWA Library has two main divisions – Reader Services and Information Systems and has a network of twelve service points in eight different buildings. The Medical & Dental Library is located adjacent to the Sir Charles Gardner Hospital and the Oral Health Centre of Western Australia. The Medical & Dental Library has twelve staff including four professional librarians. The Library has approximately 10,000 visits each month and services a wide range of clients, including the 1400 staff and students of the Faculty of Medicine & Dentistry. In 2004, 108 information literacy sessions were conducted for Faculty staff and students by Library staff.

The information literacy programme for medical students at UWA is based around the 'spiralling' curriculum with incremental development and a revisiting of important concepts over six years. A curriculum-integrated approach has been taken with the development of information skills integrated into the teaching, learning and assessment of curriculum objectives and content. The information literacy programme is based around outcomes required of a medical graduate and uses the *Australian and New Zealand Information Literacy Framework* (Bundy, 2004) and its associated learning outcomes. An extract from the UWA information literacy framework for medical students is in Appendix 1.

METHODOLOGY

The *ISS* was administered to first year medical students in October 2004. The *ISS* was administered to fourth year medical students in January 2005.

To confirm the validity of the survey results, other forms of evaluation were also used. At the time the *ISS* was administered, students were also asked to answer two written questions on whether or not they thought the *ISS* covered all areas of information literacy that would be required by medical students in that academic year. Fourth year students were also interviewed to determine additional information literacy areas that may not have been covered by the *ISS*. This triangulation was designed to identify any weakness in the design of the *ISS*.

The study has some limitations. The first year students were surveyed in October 2004 and had only general information literacy knowledge and it was hypothesised that the *ISS* would be valid for this group. The students in their fourth year were surveyed in January 2005 and should have shown a significant amount of discipline specific knowledge - this is the area that was expected to identify the appropriateness of the *ISS* for this discipline. Ideally, the study would have surveyed the same cohort. Although this is a limitation of the study, the applicability of the *ISS* in different years of the course can still be determined through two different cohorts.

RESULTS

As the *ISS* uses an ordinal scale with a maximum range of four, statistical significance was determined using non-parametric tests (Mann-Whitney U, Wilcoxon W and Z). For all tests, the results were consistent. Seven of the twenty items were statistically significant at the 5% level. The *ISS* item numbers, their alignment to the *Australian and New Zealand Information Literacy Framework* (Bundy, 2004) and their level of significance is shown in Table 1. Items that are significant at the 5% level are in shaded bold italics. Note that there are no questions in the *ISS* relating to Standard 1.

<i>ISS</i> item number	<i>IL Standard</i> Number	Mann-Whitney U	Wilcoxon W	Z	Significance
1	4	3708	10848	-3.605	.000
2	4	4448	11708	-1.882	.060
3	2	4874.5	12134.5	-0.731	.465
4	5	3947.5	11087.5	-2.845	.004
5	3	3703	10843	-3.721	.000
6	4	4355.5	8010.5	-1.779	.075
7	6	4820	12080	-0.922	.357
8	3	3949	11209	-3.077	.002
9	4	5019	12279	-0.354	.723
10	6	5151	12411	-0.025	.980
11	3	4854	12114	-0.782	.434
12	2	4303.5	11443.5	-2.111	.035
13	6	4908	11929	-0.422	.673
14	2	5021	8762	-0.353	.724
15	5	5058	8799	-0.16	.873
16	3	5014	12274	-0.39	.697
17	5	5156	8897	-0.01	.992
18	5	4320	11580	-2.15	.032
19	2	4755	12015	-1.06	.289
20	6	4342.5	11602.5	-2.068	.039

Table 1 Level of significance of *ISS* questions and *IL Standards* as determined by non-parametric tests.

Cronbach's alpha was used to determine internal consistency of the *ISS* questions. A high alpha value would mean that items were positively inter-correlated and are measuring the same concept (Shaw-Taylor, 1999). For

most purposes alpha should be above 0.80 to support reasonable internal consistency (Cronbach, 1951) The minimally acceptable level of internal consistence reliability is 0.70. Values any lower than this would mean that items on the scale were not entirely consistent with the person’s attitude to the issue (Aday, 1996). In this study, the overall reliability for all students (years 1 and 4 combined) was a Cronbach’s alpha score of 0.845. That is, the items in the ISS had a strong relationship. Overall reliability for Year 1 was 0.849 and for Year 4 it was 0.840. Year 1 is slightly higher than Year 4 but both reliabilities are extremely high, showing good inter-item consistency of the *ISS* for both years.

After completing the survey, students were asked to give written responses to two additional questions.

1. Are there any skills related to research and information gathering for your first/fourth year medical studies that are not covered by the survey? If so, what are they?
2. Are there any questions in the survey that are not applicable to your first/fourth year medical studies? If so, what are they?

Responses can be categorised into several main areas as outlined in Tables 2 and 3.

ANALYSIS OF QUESTION 1

Category	Year 1 n (%)	Year 4 n (%)
No suggested additions	30 (50)	25 (59)
No response	8 (13)	7 (16)
Don't know	2 (3)	1 (2)
Medical journal databases	17 (28)	4 (9)
How to reference correctly	1 (2)	1 (2)
"Use of dictionaries and encyclopaedias"	1 (2)	0 (0)
"Awareness of library subscriptions to otherwise password protected resources"	0 (0)	1 (2)
"Validity of medical information"	1 (2)	0 (2)
"Importance of comparing research to actual clinical experience" i.e. "talking to skilled clinicians"/"Gathering information from human sources"/ "Clinical application"	0 (0)	3 (6)
TOTAL	60 (100)	42 (100)

Table 2: Results of additional question 1 by category

ANALYSIS OF QUESTION 2

Category	Year 1 n (%)	Year 4 n (%)
No suggested additions	33 (50)	26 (57)
No response	10 (15)	5 (11)
Don't know	3 (4)	0 (0)
Comments related to Standard 4	0 (0)	4 (9)
Comments related to Standard 5	7 (10)	2 (4)
Comments related to Standard 6	13 (20)	7 (16)
"Many"	1 (2)	0 (0)
"A lot of them seem to repeat"	0 (0)	1 (2)
TOTAL	66 (101)	45 (99)

Table 3: Results of additional question 2 by category

Note that some students identified more than one *ISS* item in Question 2, leading to a difference in totals.

CONCLUSION

The major outcome of the research was the recognition by the fourth year students that the information resources they need for the clinical years of their medical course is different to that of the pre-clinical years. This was apparent from the *ISS* where the first and fourth year students were significantly different in seven of the items. In fact, first years rated themselves more highly in all areas. Analysis of the areas of difference showed that the fourth year students' approach to finding, evaluating and using information has begun to change in line with their exposure to clinical practice. First year students focus their information skills around the use of textbooks, journal articles and web sites. Fourth year students are becoming aware that there is a much broader range of resources to draw from, including colleagues. The world of information resources is changing for fourth year students and their lower self-rating on the *ISS* illustrates their increasing awareness of the complexity of information retrieval.

The overall reliability of the questions in the *ISS* was similar for both groups of students. This suggests that overall the *ISS* is valid and reliable for

students in years one through to four of the medical course. However, the more detailed analysis of the subscales revealed that some of the items were much more reliable than others and these need to be examined closely.

Fourth year students identified two main areas of difference in the additional questions and in the interviews. Both related to the clinical setting. The first is the need to consult with colleagues and the second is the specific skills that are required to find information to answer clinical questions.

Additional research in the following areas should be pursued:

- To confirm that the difference between the first and fourth year students are due to the explanations identified in this research, the *ISS* should be administered to the first year cohort again in the third and fourth years of their medical course. It could be hypothesised that the self-report of information literacy skills would rate more highly at the end of the students' third year. Fourth year results should mirror those of the fourth year cohort in this study ie students would have rated themselves more highly in their first year of study than in their fourth year of study.
- The Information Skills Survey should be modified for medical students. Further research in the area should focus on designing and validating additional questions and integrating these with relevant questions from the current version of the *ISS*. Additional questions relating to the following areas should be validated as reliable: recognizing the need for information, using colleagues as a source of information, use of consolidated information resources, use of electronic sources of information.

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**University of Western Australia Outcomes-Based Information Literacy Checklist for Medicine
(by Year Outcome)**

Outcomes for the UWA Medical Graduate

- Have the appropriate skills and attitudes to provide responsible clinical care within their professional limitations.
- Demonstrate knowledge and ability to engage in continuing self-education and further learning in their chosen field of medicine.

1. Defining the Topic

- *The information literate person recognises the need for information and determines the nature and extent of the information needed.*

Year Outcomes	Unit Outcomes	Info Lit Outcome
Years 1 and 2 Ability to select, access and use a range of information resources.	<u>FCP 111 and 112</u> Demonstrate independent research skills – including information retrieval.	The student lists the keywords and concepts for their research topic.
	<u>FCP 211 and 212</u> Critical analysis of major research designs used in the medical literature.	The student gains an overview of a topic using encyclopaedias, textbooks and review articles.
		The student reviews published knowledge and determines if they need to broaden or narrow their topic.
		The student works out what they already know on a topic and identifies the gaps in their knowledge.
		The student recognises the need to seek expert help when required and knows the importance of the Library in the information process.