

Test them, teach them, test them; can a one-hour library tutorial improve students' information literacy?

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***Abstract:** The Faculty of Engineering at the University of Auckland recognizes the importance of information literacy (IL) to both the academic learning and the subsequent professional practice of its students. A collaboration between a Senior Lecturer and two Librarians explored ways of improving the IL skills of a post-graduate engineering class. The pilot comprised: a pre-test of students' IL skills, a one-hour hands-on-computer tutorial tailored to a course assignment, a post-test of the student's IL skills, the assignment results, and students' evaluations of both the tutorial and the course. In this paper we will discuss the aims, methods used, results achieved, lessons learnt, and proposals for future improvements.*

Introduction

The 'Advanced Power Systems' course at The University of Auckland covers various advanced topics in power systems with half on the application of power electronics in power systems. The course includes a research assignment worth 15% of the total course marks. There are usually about 30 students; a mix of postgraduates and 4th year BE (Bachelor of Engineering) students whose grades in the undergraduate Power System course are high enough to be accepted. Some of these will not have studied at The University of Auckland before, and some will be facing their first research-intensive assignment.

In the past, students in the 'Advanced Power Systems' course had been taught research and database skills by the Subject Librarian as The University of Auckland Library provides a wide and diverse range of resources, and as a literature search was required by the assignment. The IL teaching consisted of: a 1 hour hands-on-computer tutorial structured around the research assignment, an exercise sheet for the tutorial, and a handout with extensive backup content. The teaching materials were available after the tutorial online through Cecil (The University of Auckland's Enterprise Learning Management System), and one-on-one help from the Subject Librarian was also offered.

In 2006 the authors and Li Wang (Manager of Learning Services, The University of Auckland), decided that the efficacy of the existing practice needed testing. Student evaluations of the library tutorial had been positive but there were doubts about the adequacy of the students' IL skills coming into the course, for example, how much information they had absorbed during the course, whether they applied what they learned in researching their assignment and doing their other course work, and what they took with them into their professional lives.

The project

It was felt that, in general, the IL skills of undergraduate and postgraduate students were inadequate coming into the course. And that their 'just good enough' and 'try out' attitude might not work well for high level learning and research; especially when they needed to conduct a thorough literature search and use the results properly on a very new and advanced topic, as is the case for the Advanced

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Power System research assignment. The project was devised to attempt to measure these assumptions and the efficacy of the IL teaching.

To ensure the project would maximize the results for the students the following steps were taken:

- Information skills were integrated into the course by making them essential to the research assignment, and worth 3%.
- To test the assumptions on what the students knew initially and what they learned from the tutorial, a questionnaire was devised (an adaptation of a CREPUQ questionnaire) for students to complete during lecture time both at the beginning and at the end of the semester's teaching.
- The information gained from the pre-questionnaire was used to tailor the tutorial to the students' needs.

The skills the participants brought to this were: Patrick's subject knowledge + class knowledge + academic teaching knowledge, Susan's research skills + subject librarian's knowledge + class tutorial experience, & Li's information skills + information literacy + teaching pedagogy.

Constraints on the project included: the volume and complexity of new materials to cover in a limited period; consideration for students who were already complaining about their lack of time; the workloads of academics and librarians; and the lack of precise knowledge of what the participants did and did not know.

The questionnaire

The questionnaire, which was used for both the pre- and the post-test, consisted of introductory queries to determine students' familiarity with The University of Auckland and its resources, and 11 multiple choice questions to test their IL skills. The concepts covered by these 11 questions were:

- Knowing where to look for particular information e.g. journal articles on a subject
- Understanding reference formats and being able to locate the full text from a reference
- Constructing a search strategy using techniques like Boolean operators, nesting, truncation, etc
- Expanding a search by using cited and cited by from a particular reference
- Evaluating information
- When and how to include citations in a reference list and how to avoid plagiarism.

The tutorial

After the pre-questionnaire was conducted and analysed, both the tutorial and the accompanying handouts were altered to better meet the students' needs; to contain only examples directly relevant to the assignment's subject area such as power electronics converters in power systems, wind and solar power connections; and to provide 'use later' information sources and hints.

The gaps identified included:

- Understanding reference formats and being able to locate the full text from a reference (2 questions - 16 right, 35 wrong, and 8 don't know)
- Constructing a search strategy using techniques like Boolean operators, nesting, truncation, etc (3 questions - 20 right, 55 wrong, 8 don't know).

The assignment

For the assignment students could choose their own topic in the area of the application of power electronics in power systems. The specific requirements for the IL component of the assignment were:

- To undertake a thorough literature search to find relevant references, which could be conference/journal papers, research reports, book sections, patents, etc. To use Endnote software to organize the searched references.
- To evaluate and summarize the searched literature, and to present a thorough understanding of the topic. The summary should be supported by at least 10 references; those most relevant to the chosen topic.

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- To give general comments on the topic based on both the published work found in the literature search and students' own work, to identify any problems, and make suggestions for future research.

The results

Questionnaire:

The results from the questionnaire show an improvement in students' IL skills after the tutorial. However, the sample size was small (around 30) and the response rate differed between the pre and post questionnaires, so no conclusions can be claimed to be statistically accurate.

The results of the two questionnaires for the six concept categories are summarised as:

- Knowing where to look for particular information e.g. journal articles on a subject (2 questions - pre: right 57%, wrong 43%; post: right 73%, wrong 27%)
- Understanding reference formats and being able to locate the full text from a reference (2 questions - pre: right 28%, wrong 61%, don't know 10%; post: right 43%, wrong 55%, don't know 2%)
- Constructing a search strategy using techniques like Boolean operators, nesting, truncation, etc (3 questions - pre: right 24%, wrong 66%, don't know 10%; post: right 37%, wrong 58%, don't know 5%)
- Expanding a search by using cited and cited by from a particular reference (1 question - pre: right 57%, wrong 39%, don't know 4%; post: right 66%, wrong 27%, don't know 7%)
- Evaluating information (2 questions - pre: right 75%, wrong 13%, don't know 11%; post: right 77%, wrong 15%, don't know 8%)
- Knowing when to include citations in a reference list and avoiding plagiarism (1 question - pre: right 89%, wrong 7%, don't know 4%; post: right 81%, wrong 3%, don't know 16%).

While the examples used in the questionnaires were chosen to be relevant to the course, the language was still too complex for some students, and the questions relating to search strategies gave particular difficulty. This could be improved if terms like 'phrase' & 'database' had their meaning spelt out.

It is essential that enough time be allowed to complete the questionnaire properly. As it was given at the end of the lecture it seems the students completed it quickly, rather than accurately, so they could leave early.

Tutorial:

Whilst the content of the tutorial was tailored to reflect gaps shown by the pre-questionnaire, it still overestimated the basic library skills of much of the class. The change in contents also made it impossible to fit in everything it was desirable to teach. To counteract this the handouts were expanded to provide pointers to useful information like Library websites and Endnote courses. Such back-up materials were re-enforced by Cecil messages, but some students still didn't do the follow-up that was required by the assignment. Examples of this were: not providing the number of references required; not searching enough sources; and not using Endnote to manage their references.

Assignment: The IL part of the assignment was worth 3% of the students' final mark for the course. Out of 30 students:

- 2 students gave less than the 10 references required
- 17 students gave some of their references in an incorrect or incomplete format
- 10 students used only IEEE Xplore for their literature search
- 2 students did not use Endnote as required.

In general the students used citations in the assignment well, although some comments could have been more critical and accurate.

Examples of evaluations: (their spelling, not ours)

- "The way we can help outself for out assignment its awsome and it is also beneficial for out future needs abut some topics."

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- “was very useful and informative should be taught as compulsory in second year so 3rd year and 4th year could have been easy.”
- “Longer duration earlier in the year”
- “by talking more about endnote.”
- “more time or slower presentation”
- “I learnt something which I never would have found out myself.”

Where to from here?

It would be a useful exercise to repeat. The changes to be made to the questionnaire are outlined above. The assignment could be re-structured so that references must come from more than IEEE Xplore, and each student's choice of the best 10 references must be justified. Additional assistance to student learning could be offered by, for example, the setting up of Cecil or Oasis (another online teaching and assessment software system developed by the Department of Electrical and Computer Engineering, The University of Auckland) practice tests which students would be required to pass, and/or specific Voyager & Endnote courses.

The aim would be to reinforce the long-term usefulness of the information skills without overloading students. As the IL section of the assignment is only worth 3% the workload involved cannot be too high.

Conclusions

This project shows that a one hour tutorial on IL improves students' skills, but only to a limited extent. It is apparent that more follow-up is needed, but whether this is better done in a class-room or by directed student work during their study term is still to be determined.

The collaboration between academic and library staff was crucial. It was time consuming, but the value lay in the different viewpoints and skills brought to the project.

Students have a high workload, so making the content relevant and mark-earning was a winner for catching their interest and engagement.

The questionnaire revealed that, as suspected, the students' IL skills, even of the 4th years and post graduates, were poor on many basic levels.

If an information literacy 'driving license' or the like could be made obligatory, then all students would be enabled to improve their IL skills, to the benefit of their academic learning as well as their subsequent professional practice.

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