

I didn't know what I didn't know – Postgraduate science students as new library users

Bruce White, Science Librarian, Massey University Library, Palmerston North

Barbara Rainier, Science Librarian, Massey University Library, Palmerston North

Background

While considerable effort goes into equipping undergraduate students in science, technology, engineering and medicine with knowledge discovery skills and an understanding of the scientific literature, many of them complete their first degrees with a relatively basic level of competence. Undergraduate science education demands an intensive development of subject knowledge and technical skills with less emphasis on the primary literature, and unless an information literacy element is expressly built into science programmes undergraduate students are not routinely required to make use of library resources (Bogucka & Wood, 2009; Wiegant, Scager, & Boonstra, 2011).

Postgraduate study, particularly at masters and doctoral level, places quite a different level of demand on students, and even to formulate a research question requires an extensive knowledge of the existing literature. The first part of the thesis journey is the literature review which provides a theoretical and methodological grounding of the whole project, but students often arrive at postgraduate study poorly equipped to perform this task (Hoffmann, Antwi-Nsiah, Feng, & Stanley, 2008; Miller, 2014). Those skills that they have acquired tend to be based around Google and Google Scholar (Wu & Chen, 2014) which provide a good result for relatively little effort, but which lack the functionality to fully support a literature review at this level (Johnson & Simonsen, 2015). Increasing internationalisation of postgraduate education is another factor impacting on this situation, although it would be wrong to assume that English-speaking students or those from “developed countries” possess the appropriate skills for an advanced degree literature review.

Searching for Science

Massey University Library began offering formal one-on-one research consultations to postgraduate students in the late 1990s, and this has proved to be an effective means of raising skills and supporting research activity. The advantages of research consultations are numerous – they provide targeted advice and assistance geared to the individual student's skill level and research area, they are available at point of need and they offer the possibility of an ongoing supportive relationship between subject-specialist librarians and higher degree students (Magi & Mardeusz, 2013; Warburton & Macauley, 2014). However, when the Knowledge Management in Research (KMIR) series of workshops was introduced for university staff in 2003 many masters and doctoral students chose to attend them as well as, or in preference to, booking research consultations. The KMIR workshops were cross-disciplinary and generic, which made it easier to focus on the search process rather than on discipline-specific content.



In 2011 the Library moved to replace the KMIR programme with a new set of workshops for academic staff and postgraduate students which are now being delivered as the Research Development Library Workshop series, but in the transitional period between these two offerings the science subject librarians became concerned that there was no training available for the large number of masters and doctoral students at the Manawatū campus. In late 2014 the first Searching for Science workshop was run and it has continued to be offered to the present. It consists of two parts –

- Pre-workshop engagement - Three short online presentations and a self-testing quiz covering the basics of topic analysis, keyword selection and the mechanics of database use. Four days before the workshop links to these are emailed to students who have enrolled.
- A ninety minute workshop consisting of
 - A group exercise involving an analysis of the keywords for two articles that have been sent to participating students before the workshop.
 - An individual guided database exercise using a detailed workbook. Students are able to use either one of the topics from the group exercise or to work on their own topic.

By adopting a flipped classroom approach we are able to deal with the different levels of prior knowledge and skill that participants bring to the workshop and present information about the basic techniques of Boolean logic and keyword selection in a way that allows novices to work at their own pace while not taking up workshop time with material that would already be familiar to some participants. The techniques covered in the online presentations are used in the group exercise and feed through into the individual exercise so that students are led from a schematised presentation of database use to a hands-on implementation over the course of two or three days. The exercise workbook doubles as a manual so that the content remains available to the students as a resource. Participants are given the choice to carry out the exercise in either Scopus or Web of Science and there are two versions of the workbook. They were encouraged to take both away with them at the end of the session.

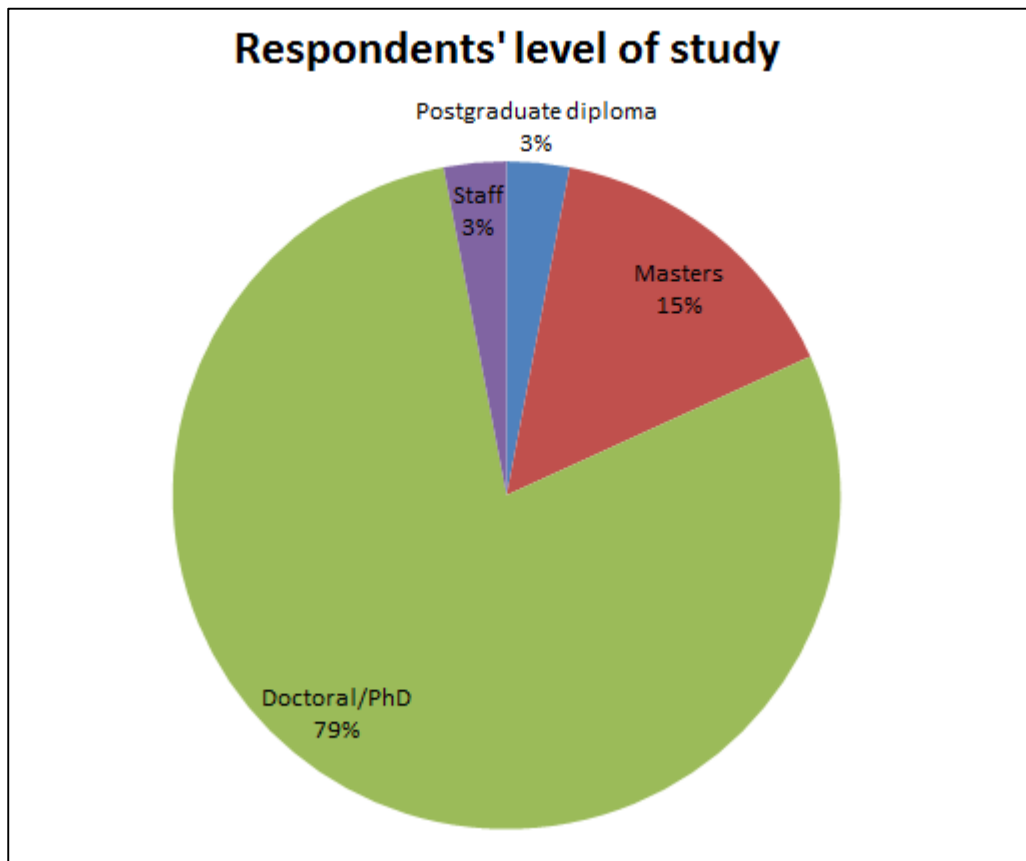
The response to Searching for Science was immediately enthusiastic and the workshops have now been held a total of thirteen times. Advertised by email to postgraduate students of the Colleges of Science and Health they are always fully subscribed within hours and, although not all those who enrol actually attend, so far a total of 111 students have gone through the programme. Over time content and delivery have been refined and developed and the number of library staff involved has grown. Experience has shown that students working on the individual exercise often need quite intensive help so that the workshop takes on some of the aspects of a consultation while retaining the advantages of discussion and mutual discovery that come from the group context. In April 2016 the decision was taken to run the workshops on a monthly basis so that in theory they are now available close to the point at which the student recognises the need for training.



The Research

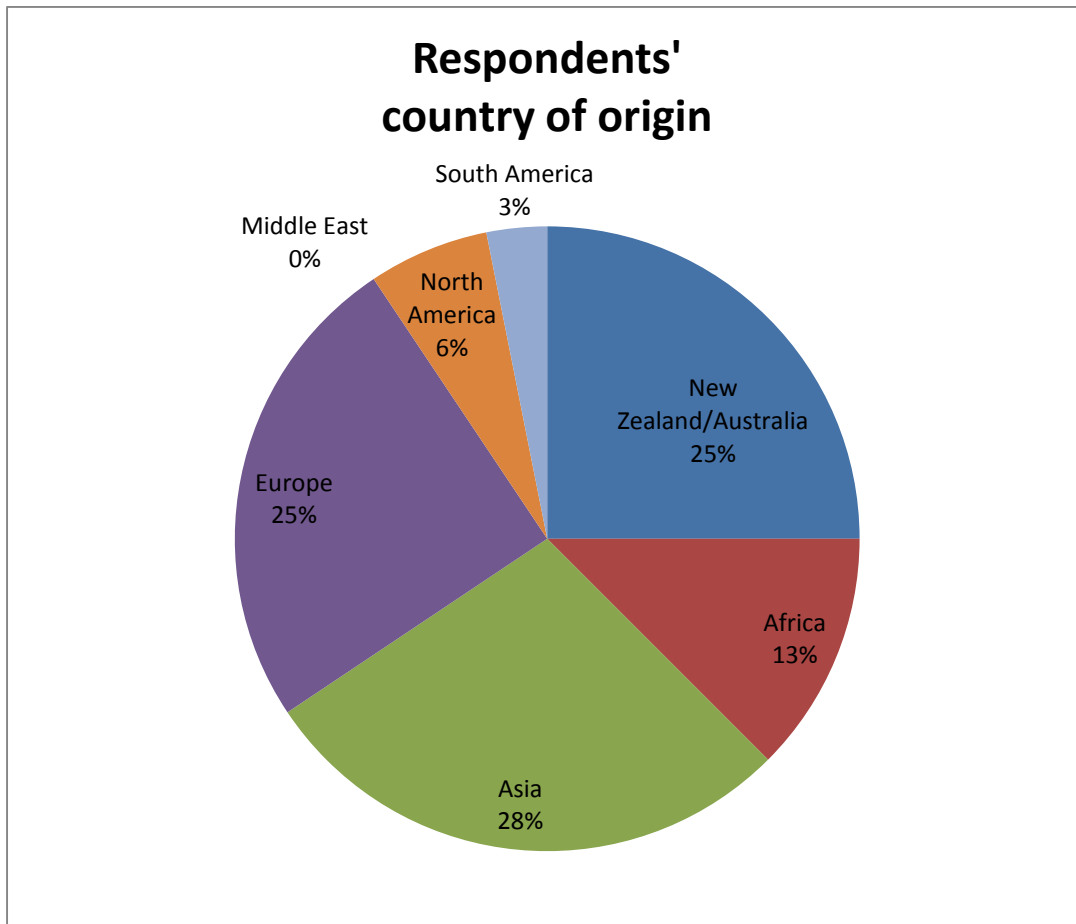
Evaluation forms are distributed at each session and these indicate a consistently high level of engagement and satisfaction with the programme, but post-session evaluation does not show whether the students have actually altered their knowledge discovery and management behaviour as a result of the training. To find out what had happened after the workshop an online multi-choice survey was sent to all 111 attendees and 33 responses were received (30%). Not all of the questions are reported on here.

Question 1 – Respondents' Level of Study



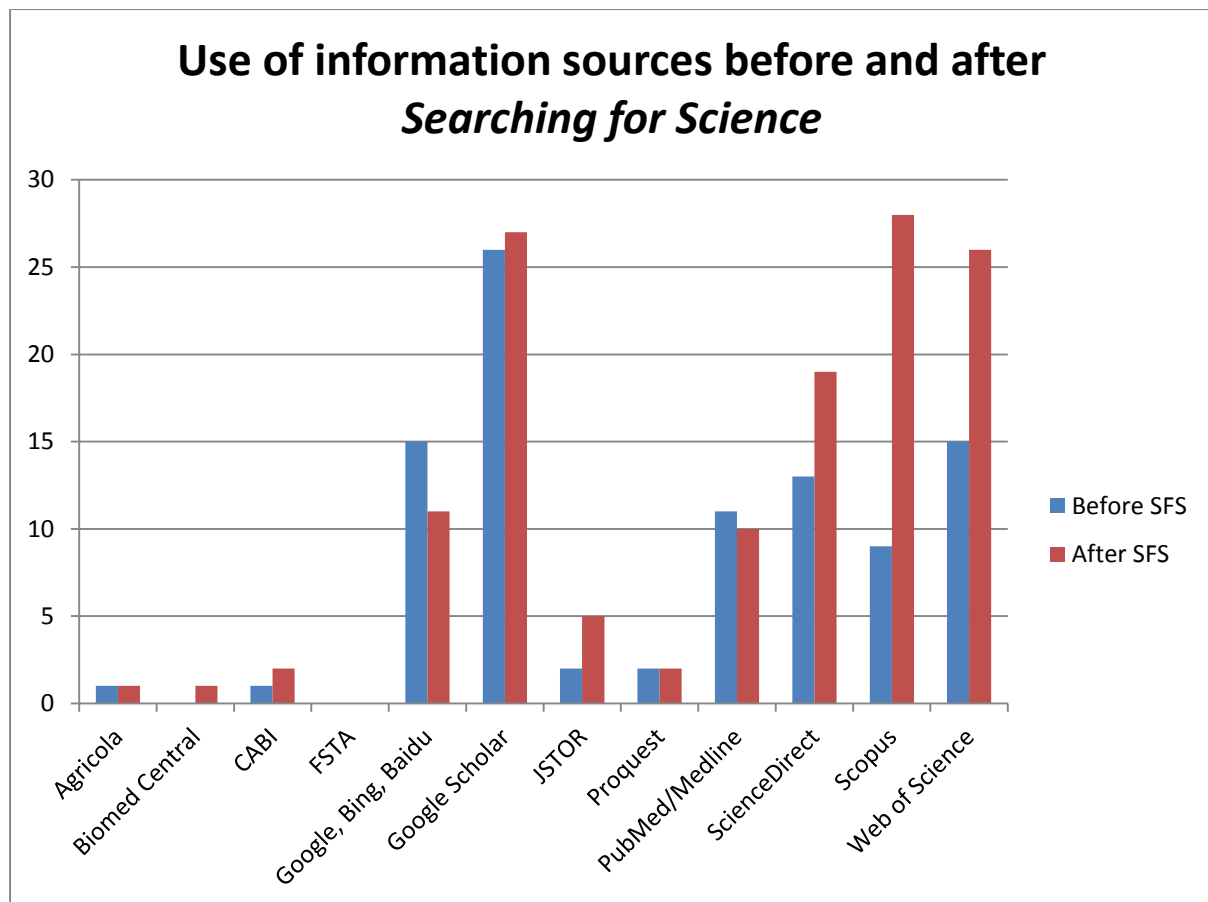
The actual proportion of doctorate to masters students in science is less than 1:2 which indicates that the programme was particularly appealing to this PhD students.

Question 2 – Where Did Respondents Complete Their Undergraduate Study?



New Zealand nationals make up around 45% of Massey postgraduate science enrolments so were somewhat under-represented in our sample, while those from Europe, Africa and North America were over-represented. This question was asked in order to ascertain whether our study was looking at purely local or national phenomena or whether the results would be more broadly generalizable. The under-representation of New Zealand students confirmed our observation that international students are more likely to take advantage of training opportunities and support services.

Questions 5 and 6 – Respondents' Use of Databases and Search Engines Before and After Searching for Science



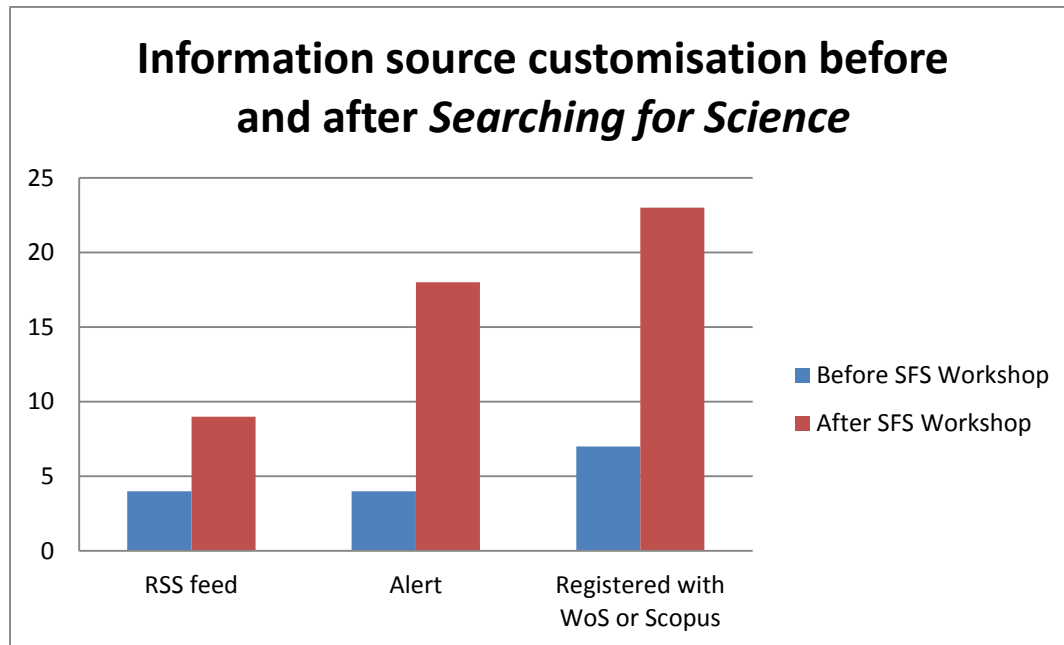
The primary purpose of the survey was to determine whether attendance at Searching for Science had altered the knowledge discovery practices of attendees, but it was decided not to approach this topic by asking directly about search techniques as this sort of question in a multi-choice survey would have involved a degree of prompting. Instead, respondents were asked which databases and search engines they used before the workshop and which they were currently using as a more objective indicator of changed practice.

Before the workshop respondents had relied mainly on Google Scholar as well as the general search engines (Google, Bing and Baidu) and Web of Science, with a smaller number using the free databases ScienceDirect and PubMed. Scopus was used by only 9 students out of 33 (27%). After the workshop this situation had changed dramatically. Use of Google Scholar had increased slightly while use of the general search engines had declined with only a third of students still using them for research knowledge discovery. Scopus was now being used by 85% of respondents, more than the number using Google Scholar, with Web of Science not far behind. This was an interesting result because during the workshops it had emerged that fewer students were familiar with Scopus and, although it was not exactly pushed at them, attendees who had not previously used Scopus were encouraged to try it. What is also evident from these figures is that more of respondents are using a range of sources – where most of them had previously relied on Google Scholar they were now



supplementing it with Scopus and Web of Science as well. One of the major learning points of the workshop is to extend students' use of Google Scholar to include the formally-structured databases and this goal has clearly been achieved.

Questions 6 and 7 – Use of Customisable Features of Databases and Search Engines



Knowledge discovery is a dynamic process and one of the aims of Searching for Science is to introduce attendees to alerting and current awareness features of databases and search engines. This appears to have been moderately successful.

Reflection

Searching for Science was initially designed using our experience of teaching university staff and students, but with hindsight it is apparent that the workshop is based on sound adult learning pedagogy. Offering the workshops regularly means that students can sign up as close to point of need as possible and feel they have taken an active step towards their literature review task. The pre-workshop activities allow for a self-paced and reflective approach to the technical content of the upcoming workshop, in addition to providing time for the reading of the scholarly scientific article. The presentation of pre-workshop material reduces the in-class cognitive load and allows for participants to integrate previous knowledge. The satisfaction survey identified the pre-workshop material as integral to the process, and those who had not completed this component routinely rated their satisfaction lower than those who had. The workshop itself provides a context for a constructivist and collaborative way to gain new knowledge, while providing an opportunity for hands-on and experiential learning to take place. Masters and doctoral students are usually not part of a defined cohort so the workshop, although a single session, provides a social context and a small community of learning where discussion appears to easily take place. Finally the detailed workbook allows for the process to continue as the student works on their own literature search thus making it highly relevant.



Conclusion

There is an assumption that postgraduate science, technology, engineering and medicine students have the skills necessary for a comprehensive literature review, however, this is not necessarily the case. These students, particularly doctoral students, are often not aware of what skills they actually lack or how to increase their competence. The Searching for Science workshop has been shown to highlight the gap and then meet this need.

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