

## **Assessing information literacy skills in the real world: the good, the bad and the literate**

Judith Emde and Ada Emmett

Judith Emde received her M.A. in library science from the University of Missouri-Columbia in 1981. She has been employed at the University of Kansas Libraries since 1986. Her current title is Electronic Resources/technical Services Librarian and her responsibilities include management of public records for e-resources. She is also the bibliographer for pharmacy, speech-language-hearing, gerontology and general science and provides instruction for those academic programs.

Ada Emmett received her M.L.I.S. from the University of Washington's Information School, June 2002. She has been in her first librarian position as a Reference Librarian at the University of Kansas since September 2002 and is a bibliographer for chemistry and molecular biosciences. She teaches a one-credit chemistry course on chemical information resources and has an ongoing interest in innovative projects that address current issues in scholarly communication.

### **Abstract**

At the University of Kansas two librarians teach Bibliography of Chemistry (CHEM 720), a one-hour credited class offered through the Chemistry Department for 1st and 2nd year graduate students. The chemistry and pharmacy bibliographers have organized and taught the class since 1995. The content and teaching methodologies have changed over time but no formal assessment had ever been conducted. For the spring 2004 semester class, a measurement tool was designed to gauge the development of information literacy skills during the course of the semester. The survey was based on a one-to-one interview with each student answering questions posed with the use of a computer to locate resources and conduct searches. The assessment was conducted before the semester session began and repeated with the same questions after the last class. The major goal was to determine if the content of the class contributed to the development of information fluency skills. To add further weight to the results, a control group of graduate students majoring in chemistry related disciplines but not enrolled in the bibliography class was also sought, but not enough students volunteered to participate to validate that part of the study. Descriptive notes based on the students' behavioral responses to the questions were collected. Results were ranked to allow for quantification, with a statistically significant increase in the students' demonstrated skills between the beginning and end of the semester.

### **Introduction**

Assessing information literacy skills in the real world does not follow a straight or easy path. In the real world, there are obstacles to overcome, less than perfect methodologies, shortage of time, and lack of sufficient study participants. In spite of those obstacles assessment projects are useful to the development and sustainability of information literacy programs on university campuses.

Various assessment projects have been documented in the literature which evaluate outcomes of library programs, librarians as instructors, and university wide programs on student learning (D' Angelo; Dunn; Pausch; Rockman). The large-scale assessment project at the California State University system engages 23 campuses in a multi-year initiative to evaluate the information

literacy skills of students across several parameters and uses a variety of methodologies, including one-to-one interviews, to assess the skills of students (Dunn).

## **Background**

Bibliography of Chemistry (CHEM 720) is a one-credit course offered during the spring semester at the University of Kansas for 1st and 2nd year graduate students. The course was added to the curriculum in 1995 and modeled after another bibliography course offered to graduate students in the Pharmacy School. The credited course meets the FLORS (Foreign Language or Research Skill) requirements expected of each student in the PhD program. To begin with E. Constance Powell the chemistry bibliographer (now at Rensselaer Polytechnic Institute) developed and taught the class with the pharmacy bibliographer joining her one year later as a co-instructor. At the present guest lecturers are invited to extend their expertise on specialized resources (e.g., EndNote). Depending on the number of students enrolled, one to two sections of the class are held once a week for 75-min. sessions, providing ample time for hands on application and completion of exercises.

Content of the course includes instruction on the major research tools in the chemical and biomedical literature and the development of appropriate research strategies. Instruction has shifted over the years to mainly electronic resources due to the dramatic change in information research habits. The structure of the class sessions, held in a library computer lab, are usually composed of an introductory presentation by the instructor followed by class time for students to practice. A final project of an essay and annotated bibliography on a topic selected in consultation with the student's faculty advisor incorporates knowledge gained throughout the course for the semester. Grading is based on points received for completion of in class exercises, class attendance, and the final project.

After a year of teaching the course as a team, the researchers began to look for ways, other than traditional grading, to assess the degree to which the course impacted the students' information competencies.

## **Research Problem**

The research objectives were to assess the students' information-seeking, finding, and analyzing skills prior to the start of the semester and then at the end of the course to determine whether and to what degree their skills improved. The original research plan was to compare the progress of the CHEM 720 students with the progress of a control group composed of first year graduate students in chemistry-allied disciplines who were not enrolled in the one-credit class.

## **Methodology**

After identifying the problem, the next step was to develop an instrument that would address the research objectives. What started as a precursory look at the Association for College and Research Libraries' Information Literacy Competency Standards for Higher Education became a search for a method to assess the students' skills along Association for College and Research

Libraries' (ACRLs) parameters. According to ACRL an information literate person should master these competencies:

- determine the extent of information needed;
- access the needed information effectively and efficiently;
- evaluate information and its sources critically;
- incorporate selected information into one's knowledge base;
- use information effectively to accomplish a specific purpose;
- understand the economic, legal, and social issues surrounding the use of information;
- access and use information ethically and legally.

The challenge was to consider the ACRL list of competencies when developing the information need scenarios for the assessment tool. These scenarios would then determine whether and to what degree the students demonstrated those competencies.

Therefore the final questions asked in the assessment did correspond to the following ACRL standards by asking the student to demonstrate acquisition of the following skills:

- ability to access needed information effectively and efficiently (finding the resource to answer the question, at least in the electronic versions);
- ability to evaluate information and information sources critically (determine whether the resource they mentioned did in fact provide the information);
- ability to understand the economic, legal, and social issues surrounding the use of information, including the ethical and legal use of information (consider the copyright implications of publishing a journal article, the steps taken to publish, and the meaning of plagiarism).

The one-to-one interview style of assessment allows researchers to gather rich qualitative information about what strategies students used, how efficient they were used, and the degree of their success.

Important indicators of an informationally literate graduate student included knowing how to maneuver through the university library website and how to find materials in the online catalog. Essential research skills for the chemistry graduate student to develop included knowing how to find physical property data, how to identify and successfully search in citation databases, and how to obtain access to an entire article from those citation databases.

Initially the researchers sought participants for the study from two different groups of students. The first group was composed of students enrolled in the one-credit class (CHEM 720) taught in the spring semester of 2004. The second group was a control group of students not enrolled in the class but in an allied chemistry discipline. Participation would be mandatory for the CHEM 720 students, but they would have the right to refuse permission for researchers to use their data for this study.

Small incentives were offered to attract participation in the control group. Ultimately four students were willing to participate in the control group although such a small number of participants would not constitute a viable number to generalize about their progress compared to the progress of the 26 students enrolled in CHEM 720. This was a disappointment to the

researchers, but also a learning process about research incentives for participants, funding rules, and sources.

Participants met with one researcher for about an hour at the beginning and the end of the semester. Each student was presented with a series of information-seeking scenarios (see fig. 2 for an abbreviated description of each question, displayed in the graph) and could use any resource to find a solution to the question. Students could use the computer and consult resources in the library collection. (See <http://www.people.ku.edu/~jemde/> for the entire question set of the study.) The researchers documented the steps taken by the student to address the questions posed. An example of an observation might be, “opened browser; went to online catalog; typed a keyword relevance search; typed Diels-Aldrich; located book; did not know ILL.”

Once the assessing phase was completed, the questions and responses were grouped according to their relationship to a common theme, (e.g., identifying books available in the libraries through the online catalog). Ultimately the 29 separate scenarios were ranked for all 33 respondents by both researchers independently. Each group was assigned a ranking from 0 to 3 based on the response from the student. A response was defined as a collection of behaviors or actions that the student took on her way to a final answer. A score of 0 was assigned to the response when the student did not know the answer to the question and did not attempt to locate the answer. A score of 1 was assigned when the student provided an incorrect response or at least attempted unsuccessfully to identify the information requested. A score of 2 was given when the answer was partially correct. A score of 3 was given when a correct answer was provided. Initially, the two instructors assigned the rankings individually. Differing scores were noted and the researchers determined a common ranking together.

## **Results**

The original intention of the research project was to measure the degree of skill development of the students trained in the semester long course and compare their progress to a group of similar students who received no training during the same time period. Due to the low number of participants to serve as the control group, only data from the 26 trained students and four untrained students is available. Significant growth in skills was noted for the students enrolled in the course.

The data was analyzed by applying several t-tests. Paired samples t-tests were used to determine whether students' literacy competencies improved significantly during the course of the semester. These tests indicated a statistically significant difference between the precourse and postcourse scores for the students enrolled in the class ( $t(25)=-15.14, p<.001$ ). The precourse mean was 1.83 and the postcourse mean was 2.70 with an improvement of .87 on a scale of 0-3. Figure 1 compares the outcomes of the untrained group with the trained students. The untrained students demonstrated a much smaller range of skill development.

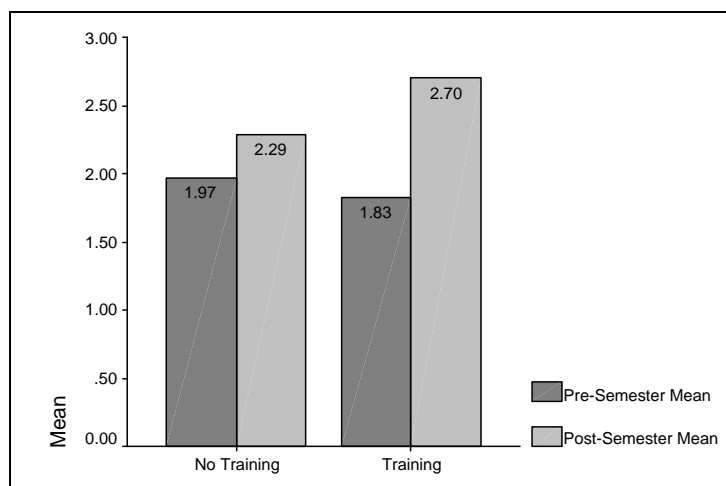


Fig. 1. Average rate of improvement in trained versus untrained students.

In addition to an overall improvement in the mean of the rankings, figure 2 compares the pre- and post-rankings by question for the students enrolled in the class. Questions with notable improvement included identifying databases other than Google for locating chemical literature, explaining the significance of copyright in publishing, and understanding the applications of a citation manager tool.

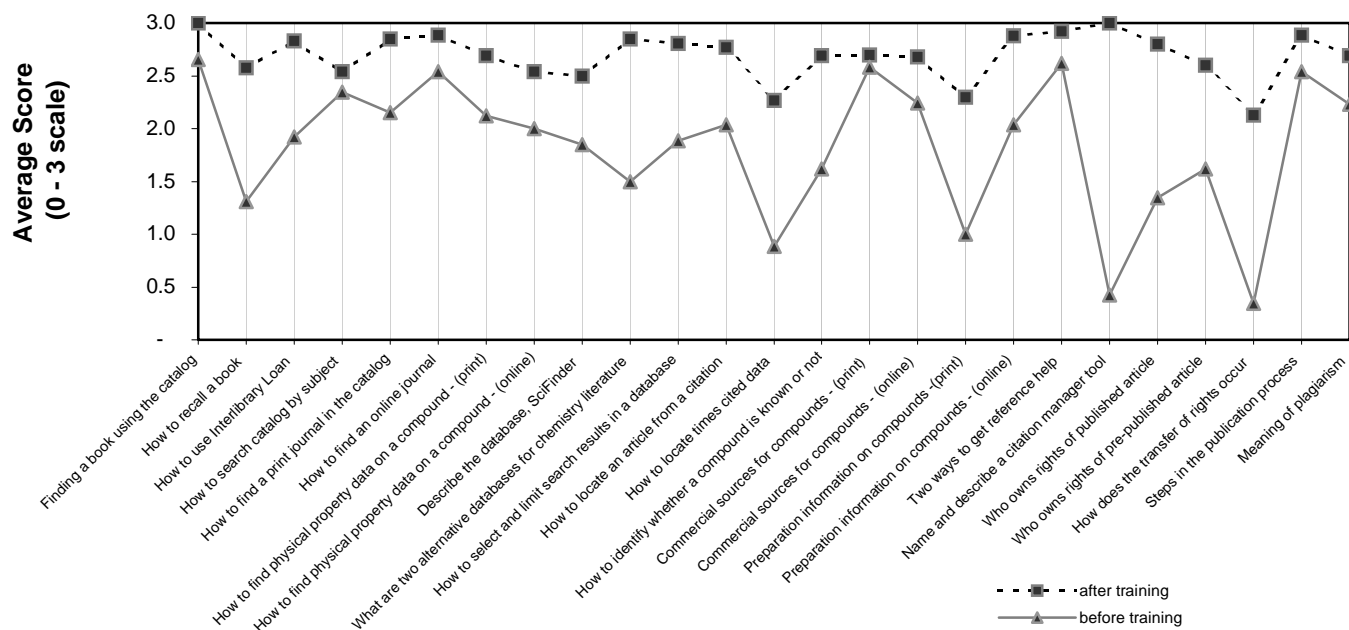


Fig. 2. Skill improvement by survey question.

## Discussion

While the findings indicate significant improvement in information literacy skills of the students enrolled in the chemistry bibliography class, the following observations were noted in comparing the trained and untrained groups: both groups of students were equal in their status as graduate students and in their broad chemistry discipline at the beginning of the semester; information-seeking skills were gained as indicated in the study; students trained in the semester long course improved more.

In spite of the success of this pilot in measuring, to some degree, the students' skills at the beginning of the course and at the end of the course, there are several additional steps that researchers would implement differently in future years. Such steps might include fine-tuning the information need scenarios presented to the students to more closely reflect the information-seeking skills they will need to develop to succeed as chemistry researchers and future faculty. Streamlining the researcher/observer data-collecting tools will ease the process of ranking the data at a later date. Widening the ranking scale and standardizing the ranking procedures will provide richer and more objective data. Obtaining research funds for participant reimbursement or compensation (without the difficulties encountered with state funds) will likely attract a larger pool of students for the control group.

Utilizing the interview method in assessing students' information competency skills has several major advantages. Students had one-to-one time with the instructor, turning the assessment into a learning tool itself. Students were able to self-assess, noting on final course evaluations that the assessment helped them to recognize what they had learned during the semester. The instructors could gauge the current skills of the students and adjust the class syllabus appropriately. Indirect data about how students used the KU Libraries website to find information was noted and passed on to the Libraries' web design committee. Such information may prove useful as the committee continually tries to improve the library website in order to address the information-seeking patterns of its users.

Although not an easy or straightforward path, assessing the information literacy skills of a graduate student using a one-to-one interview with information-need scenarios proved to be a useful way to measure the student's progress, to engage the student, and to determine her needs from the beginning of the course.

## Works Cited

- Association for College and Research Libraries, ACRL. Information Literacy Competency Standards for Higher Education. January 18, 2000. Association of College and Research Libraries; A division of the American Library Association. 10 July 2004.  
<<http://www.ala.org/ala/acrl/acrlstandards/standards.pdf>>.
- D' Angelo, Barbara J. "Integrating and Assessing Information Competencies in a Gateway Course." Reference Services Review 29.4 (2001): 282-93.

Dunn, Kathleen. "Assessing Information Literacy Skills in the California State University: A Progress Report." The Journal of Academic Librarianship 28.1/2 (2002): 26-35.

Pausch, Lois M.; Popp, Mary Pagliero. Assessment of Information Literacy: Lessons from the Higher Education Assessment Movement. 1997. 1 Aug. 2004.  
<<http://www.ala.org/ala/acrlbucket/nashville1997pap/pauschpopp.htm>>.

Rockman, Ilene F. "Strengthening Connections between Information Literacy, General Education, and Assessment Efforts." Library Trends 51.2 (2002): 185-200.