Evolving instruction delivery

for chemistry information literacy course

Introduction
At James Madison University, a chemistry information course (CHEM 481) has been taught for over twenty years. During the past decade, the course has been continually modified to reflect both changes in the skills needed by chemistry majors as well as changes in performance as course assessment. The course transformed from a class taught primarily by chemistry faculty to one that is co-taught with librarians. Each class session involves a learning activity that promotes learning outcomes derived from ACRL information literacy standards for the sciences and the SLA/CINF information competencies for chemistry undergraduates. Course assignments include team-based learning activities that allow for greater student interaction. Pre-test and post-test information is gathered as content as well as mode of delivery.

Evolution of a course

Original Structure- Skill based:
- Taught primarily by chemistry faculty
- Chemistry Literature provided in sections
- Many assignments focused on bibliographic, database searching

Evolution 1: Co-teaching
- Taught by chemistry faculty and library faculty
- More content provided about relevance of skills
- Readings paired with homework assignment
- Mixture of skill based and application based assignments

Evolution 2: Online
- Taught by chemistry faculty and library faculty
- Moved to be fully online course
- Taught by library faculty

Current Structure- Application based:
- Retained in-person instruction delivery
- Taught by chemistry faculty and library faculty
- Focused on outcomes
- Activities are closely matched to objectives

Sample Assignments matched with Objectives

Activity: Semi-annotated Author Bibliography
- Prepare a bibliographic entry of a specific author of your choice from 2000-present in ACS citation style (MLA) and prepare an annotated bibliography for three of the entries. After reading the papers and summarizing the articles, identify how the paper contributes to the overall field and could be used to find other related papers of significance.

Objective: Students should be able to demonstrate the following skills:
- Understand the content and organization of a database
- Use appropriate searching within chemistry databases for literature searches
- Be able to read literature critically
- Understand what a citation referencing search is, why it is useful, and how to do it.

Activity: Deja vu. Similarities in Scientific Publishing
Students are given articles that have been once- or being potential duplicate publications in the DejaVu database (http://dejavu.vbi.vt.edu/dejavu/). For each article, students are asked if there is a good reason for the similarity or if the article falls anywhere on the spectrum of falsification – fabrication – plagiarism (FSP) by answering questions discussed in class.

Objective: Students should be able to demonstrate the following skills:
- Identify falsification, fabrication, and plagiarism
- Explain why FSP is problematic
- Distinguish between ethically acceptable/unacceptable courses of action
- Identify why citations are important
- Evaluate papers in literature for plagiarism
- Identify why manipulating papers (self-plagiarism) is not professionally ethical

Activity: Developing a topic
Why is this research important? How does it fit into the broader field? What advances in knowledge will be made if this research comes to fruition? Who cares? Define your topic of interest and locate 3-5 articles relevant to the topic. Summarize one of the review articles and discuss the search strategies and databases used to locate the review articles.

Objective: Students should be able to demonstrate the following skills:
- Search appropriate databases efficiently
- Complete a comprehensive literature search
- Locate recent review articles as a subject
- Summarize the research findings

Assessment measures

The instructors developed an information literacy test (ILT) based on the ACRL standards and the SLA/CINF information competencies for chemistry undergraduates. This ILT question set was administered in Fall semester 2002 to the class (pre-test) and again in the Spring semester 2013 (post-test).

An evaluation of the data showed a practical and statistical significance to the results. A dependent-samples t-test was run on the data. The means from the post-test were statistically significantly lower than the mean from the pre-test (t(27) = 3.69, p < .005). This effect size was calculated for the differences in the post-test and then compared to the statistically significant difference in test scores. The within-groups effect size was 1.69. This is a large effect size and indicates that the difference in scores from pre-test to post-test is practically significant.

Table 1: Chemistry ILT 2012-2013 Mean and Standard Deviation

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<thead>
<tr>
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<th>2012 Mean</th>
<th>2013 Mean</th>
<th>2012 Standard Deviation</th>
<th>2013 Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>Pre Test</td>
<td>13.36</td>
<td>11.39</td>
<td>2.59</td>
<td>1.64</td>
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<tr>
<td>Post Test</td>
<td>9.77</td>
<td>10.26</td>
<td>2.23</td>
<td>1.84</td>
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</tbody>
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Table 2: Dependent t-test Results FA12 and SP13, Total Score Comparison and Reliability Values

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<tbody>
<tr>
<td>Pre Test</td>
<td>27</td>
<td>3.69</td>
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<td>0.69</td>
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<tr>
<td>Post Test</td>
<td>27</td>
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<td>0.69</td>
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There are plans to run this assessment each year in order to analyze the results longitudinally and determine when the course materials could be improved.

Lessons learned

Information literacy must evolve as students’ expectations and methods of learning change. Providing pre- and post-tests has been a useful way to track the gains of a cohort while also identifying areas that need improvement. Question by question analysis has indicated that students needed additional, or more effective, instruction in areas of citation and plagiarism-handling use.

For future courses, instructors indicate that they have preferred in-person experiences rather than online, despite the fact that most of the information was found and utilized online. Benefits to the in-person experience are the increased opportunities for spontaneous discussion and an easier ability to form small groups for literature analysis and discussion.

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Authors:
Meredith C. Appel, Meris A. Mandernach, Yasmeen Shorish, The Ohio State University Libraries
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References:

Downloaded from http://dejavu.vbi.vt.edu/dejavu/ by user on 05/31/2012


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Yasmeen Shorish, Science Librarian, Libraries & Educational Technologies, James Madison University
Meris A. Mandernach, Head of Research Services, The Ohio State University Libraries