Teaching the Teachers: Building Information Literacy into the Biology Curriculum

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Introduction

In a world that is saturated with questionable scientific information, producing information literate students should be the goal of every institution of higher learning. There are numerous studies (Ferguson, Neely, & Sullivan, 2006; Kuruppua & Gruberb, 2006; Malenfant & Demers, 2004; Smith, 2003) that detail why information literacy should be integrated into the biology curriculum; however, there are few examples of how to do so (Bowden & Dibenedetto, 2001). At James Madison University (JMU) information literacy was successfully integrated into a core course required for all biology majors. What began as the product of a workshop has evolved into a "teach the teachers" approach whereby information literacy is integrated into the curriculum.

The Course

There are over 700 biology majors at James Madison University. To receive a B.S. in Biology from JMU, students must complete a number of electives as well as four core courses: BIO114: Organisms, BIO124: Ecology and Evolution, BIO214: Cell and Molecular Biology, and BIO224: Genetics and Development. For BIO124, the course is usually, due to transfer students, composed primarily of upperclassmen in the fall and then it is mostly first-year students in the spring semester. One faculty member, who taught BIO124 for several semesters and assigned homework in which students were asked to locate a scholarly article on a particular topic, noticed that students (whether upperclassmen or first-year students) did not understand what constituted a scholarly article. Additionally, students were unsure how to search databases and submitted some articles from websites and books. When the call for participants in the Information Literacy Workshop came, this faculty member knew he had a course that was ripe for inclusion.

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The Workshop

In May 2006, JMU Libraries and Educational Technologies held its first Information Literacy Workshop. This faculty development workshop targeted faculty teaching required courses for the major within a variety of disciplines. Faculty agreed to incorporate information literacy objectives into the course. During the three-day workshop, teaching faculty and librarians worked in pairs to integrate information literacy into the coursework of majors. The faculty member from Biology sought to modify one laboratory assignment for Biology 124: Ecology and Evolution. This faculty member, who was also the lecturer for the course, hoped that the students would be able to identify scholarly articles and learn to search databases effectively. Additionally, successful integration of an information literacy assignment into this course might convince the rest of the Biology Department to develop step-wise information literacy assignments for all four core biology courses. Although the laboratory assignment itself was not altered during the workshop, the instruction that accompanied the distribution of the assignment changed dramatically.

Semester One: Teaching the Students

As a pilot study, the librarian taught one in-class library instruction session to four lab groups. Topics covered in this session included: a background of scholarly literature, scholarly vs. popular articles, review vs. research articles, searching biology databases, search syntax, and evaluating information sources. Though taught in a laboratory setting, the librarian provided interactive instruction by bringing several journals, scholarly and popular, as well as a variety of research and review articles and allowed hands-on time for the students to explore databases. While it was important for the students to have the librarian share database searching expertise, the spring semester Biology 124 course had eight laboratory sections, too many for the single science librarian to cover.

Semester Two: Teaching the Teachers

It has been hypothesized by Miller and Bell (2005) that the future of information literacy will require greater collaboration between librarians and teaching faculty. The lecturer, the laboratory coordinator, and the librarian determined that using a "teaching the teachers" approach would be more effective than having the librarian visit each lab section. The librarian created a self-guided tutorial in PowerPoint and converted it into Flash via FlashPaper. It was then used to lead an instruction session for the laboratory instructors, who then in turn presented it to the students. The librarian treated the instruction session with the faculty the same way as those conducted the previous fall with students. Lab instructors distributed the librarian's handouts and encouraged the students to discuss the characteristics of journal articles.

Creating an Assessment Tool

In addition to revamping the assignment presentation, the faculty member hoped to create a plan to assess the effectiveness of the teaching strategy during the information literacy workshop. In any setting where it is important to determine whether the instruction is effective, it is imperative to create an assessment tool (Grassian & Kaplowitz, 2001). Assessing the instructional process and evaluating the results of the assessment allow all involved to examine whether the material covered during the instructional process was retained by the students. The librarian, the laboratory coordinator, and the lecturer collaborated to create a 30 item pre-test/post-test to determine if the students were retaining concepts covered during the instruction session. The Biology Information Literacy Test that was developed has six objectives (see Table 1) and six content areas (selecting reference sources and databases, searching databases, retrieving full text books and articles, evaluating information, understanding and using the internet, and citing sources). Analysis of the pre-/post-test results was completed by the Center for Assessment and Research Study (CARS) at JMU. After the first complete testing period, the Biology Information Literacy Test was assessed to determine its reliability as a test. Students demonstrated an increase in overall score, but some test items were questionable, in terms of validity, and therefore were revised.

Semester Three: Understanding the Assessment

During the next fall semester, the lab instructors gave the students an overview of the library using the tutorial created by the librarian. Since most of the instructors had taught a laboratory section in the spring, the lab coordinator did not opt for a "teaching the teachers" refresher by the librarian. This was the first semester that the pre- and post-tests were given by all of the laboratory sections; however, the post-test was administered on the same day as the final exam and the faculty evaluation. CARS personnel evaluated the pre and post-test results and were disappointed that no significant differences were observed for any of the content areas or objectives. Several hypotheses were suggested to explain the puzzling results including: the instrument may need to be reviewed and revised, there may be distinct differences in the student cohorts in the spring and the fall semesters, the faculty may be unaware of the content of the test and the learning objectives it was designed to measure, or the librarian did not present the "teaching the teachers" refresher. Additionally, the students may not have been motivated as the post-test was worth no credit. Any one of these factors could have influenced the lack of measurable difference in student performance between the pre-test and the post-test.

Semester Four: Teaching the Teachers, Round Two

In response to the semester three evaluation results, the librarian led a refresher "teaching the teachers" session for the spring semester laboratory instructors. At the suggestion of CARS personnel, the instructors took the pre-test to understand the types of questions being asked. While many of the instructors thought that their teaching style conveyed the information from the tutorial, they questioned the length and content of the pre-test. To allay these concerns, the test was revised, shortened, and administered to the students during the spring semester. Additionally, the post-test was given a point value as an incentive for the students to take the test seriously.

Refining the Assessment Tool

During the spring semester in addition to adjustments made to delivery of library content, the assessment tool was examined and revised. Several items were deleted and wording on a couple of questions was clarified. Analysis is currently underway by CARS for the spring semester test with the implemented changes. A formalized assessment test will allow the lecturer, the laboratory instructors, the laboratory coordinator, and the librarian to understand whether students are able to answer specific questions related to library resources covered in the tutorial. However, anecdotal evidence suggests students retain some of the information because the articles they submit for the assignment are higher in quality and are research articles, which shows they are able to discriminate between research and review articles.

Summary

Though the Biology Information Literacy Test may not ultimately prove to be a valid measure, the partnership that was forged between the departmental faculty and the librarian will continue to serve the students in this laboratory. By teaching the teachers the librarian was able to partner in the assignment design process without being overwhelmed by the instructional load. Through this two-year process of examining a key assignment, changing instructional strategies, creating a tutorial, and assessing the instruction, Biology 124: Ecology and Evolution has now become a model of success for the "teaching the teachers" approach.

Table 1: Biology Information Literacy Test Objectives

Objective
Each student will be able to identify and demonstrate the use of the most important sources to use in his/her major field of study.
Each student will be able to construct a research strategy based on how information is communicated and organized in their disciplines.
All students will demonstrate that they can begin to find credible information in various information environments.
All students will be able to evaluate the quality and usefulness of retrieved information.
All students will demonstrate that they understand the organization of traditional library materials and services.
All students will demonstrate that they know how to effectively use the Library's online catalog.

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