Background and Justification

Biology 210L refers to the laboratory component of General Biology I, an introductory course in the Biological Sciences offered at Wichita State University. The purpose of the course is to introduce fundamental concepts in cellular and molecular biology, including basic biochemistry, cell and membrane structures and functions, respiratory pathways, metabolism and photosynthesis, reproduction and regulation, phylogeny, evolution and inheritance. The laboratory component serves to develop student skills in experimental method, laboratory procedures and written communication of scientific information.

Early each semester BIOL 210L provides the students with a 2-hour laboratory session in the WSU Ablah library for introduction and instruction in library resources relating to research and scholarly communication in the biological sciences, corresponding to semester-long research and experimental projects they will perform.

Beginning in the Spring of 2015, I taught these sessions using an inherited assignment from the Instruction Librarian whose position I filled. This consisted of an introductory lecture and demonstration of library resources, article databases and search strategies, and citation instruction per the Council of Science Editors Name-Year Style format with a provided online Library Research Guide. After introduction and demonstration, the students used the remaining laboratory period to complete a 10-point graded assignment.

Reflecting on student interaction, classroom participation and questions throughout the semester, it was determined that the nature of the assignment turned student attention and concern to the complicated steps of the assignment itself and intricacies of citation while missing information literacy understandings and application of processes to their coursework. The lab instructors and I agreed to revise the assignment for Fall of 2015. Determining core learning objectives of:

- Awareness and familiarity of library resources (reference, scholarly articles & scientific journals) specific to the biological sciences
- Identification and evaluation of primary and secondary resources
- Searching strategies for biological databases and journals
- Reference and citation format and function

Redesigning the assignment as an online document in the learning management system (Blackboard), and altering the instruction delivery from introduction and lecture followed by work period to a laboratory model of recursive instruction-discussion-experiment/practice, resulting in a more interactive laboratory period performed in five distinct sections and citation review:

1. Gathering Reference Information
2. Discovering Scholarly Articles
3. Using Scholarly Journals
4. Searching with WSU Library's SmartSearch
5. Evaluating Information Resources

While this redesign enabled a richer flow of instruction and practice during the lab session, the tie of the learning objectives (this early in the semester) and the students actual research projects (conducted over
the course of the semester) remained disconnected and unsatisfactory. In addition, the varying paces of section completion by students resulted in some disruption to the instruction/practice design.

Assessing classroom participation, work period interaction with students, and consultation with departmental grading faculties it was apparent that students were focusing on discrete steps of assignment performance and correct citation practices but continued to demonstrate weakness in comprehension, understanding, literacy components and application.

For the Spring of 2016, working with the biology lab instruction team, we again redesigned the Library Workshop lab, simplifying the graded assignment and fitting it to a series of BIOL 210L assignments corresponding directly with their semester-long laboratory experiments and written research components. Through various iterations of assignment and instruction design we trained our focus on student comprehension, understanding, and applied learning, rather than discrete skill steps and performance. The graded outcomes for Assignment 2 became

1. Locating credible background information on specific topics
2. Locating peer-reviewed articles on TWO specified topics related to their semester-long laboratory and research projects

The following week, Assignment 3 was given, utilizing the articles selected in Assignment 2:

1. Creating CSE-Name-Year citations for selected articles
2. Developing knowledge relating to concepts or terms not understood in selected articles
3. Summarizing main points of selected articles

Implementing qualitative assessment (open response paper) and converging library and resource instruction with ongoing laboratory assignments in this way (end project for BIOL 210L involving research presentation with 15 or more sources at end of semester) increased assignment completion percentage (providing direct outcomes tied to coursework) and allowed me to focus library instruction relevance demonstrating notable increase in student understanding and ongoing relevant learning application. Present learning outcomes for BIO 201L Library Workshop lab are as follows:

Students will be able to:

- Distinguish and compare scholarly discourse from a variety of academic and online resources
- Collect, evaluate and restate background information utilizing library resources on two topics: the plant genus *Brassica rapa* and potato enzymes
- Locate and select relevant scholarly articles via subject-specific library databases or journals relating to their topics
- Identify parts of a citation and practice CSE-style resource citation, discussing scholarly conversation and ethical research
- Describe pathways and processes of exploring, searching and utilizing library resources

**Instrument and Methods**

Assessment methods included – graded laboratory assignments and a voluntary (non-graded) four question *Library Laboratory Review* (“minute paper” format). Details provided below.

Students were required to locate two peer-reviewed articles on specified topics related to their semester projects, show instructors and indicate whether the articles were examples of primary research or review articles (5 points).

Students were required to create CSE Name-Year citations for selected articles, evaluate and summarize selected articles in written format (5 points).
Students were requested (not required) to complete the *Library Laboratory Review* minute paper – responding to the four following questions:

1. What are some differences between scholarly literature or academic literature and other information resources (blogs, wikis, news articles, etc)?
2. What are some purposes of citation?
3. What aspects of today’s lab (or particular resources) seem most helpful to you?
4. What remains unclear or are there any questions you still have?

During SP2016-SP2017, 553 students in 25 sections of BIOL 210L attended the Library Workshop lab. Of these students 93% completed the graded assignments. The average grades on the assignments were 4.6/5.

48% of the students completed the *Library Laboratory Review* and their responses are summarized by question below (random sampling of 100 from all sections; students may have provided more than one response):

1. What are some differences between scholarly literature or academic literature and other information resources (blogs, wikis, news articles, etc)?
   - 71 responses mentioned the *review process* and *editing* of resources
   - 26 responses mentioned *reliability* or *credibility* of the resources
   - 28 responses mentioned degrees of *expertise* related to the resources
   - 3 responses mentioned the likelihood of *bias* in the resources

2. What are some purposes of citation?
   - 74 responses mentioned *giving credit* to sources of information
   - 41 responses mentioned *referencing* and *tracking* sources of information
   - 24 responses mentioned avoiding *plagiarism*

3. What aspects of today’s lab (or particular resources) seem most helpful to you?
   - 49 responses mentioned *database navigation*
   - 61 responses mentioned *research strategies*, specifying the following:
     - 13 responses specified *filtering* or *refining* search topics and terms
     - 9 responses specified utilizing *advanced search tools* in databases
     - 6 responses specified distinguishing primary and *secondary* resources
     - 8 responses specified the *Bio 210 Library Research Guide*
     - 3 responses specified learning use of *Inter-library loan*
   - 10 responses mentioned *citation instruction*

4. What remains unclear or are there any questions you still have?
   - 91 responses reported no further questions
   - 3 responses requested further *citation* instruction
   - 3 responses requested further instruction in *resource distinction and evaluation*
   - 3 responses requested further instruction in *database navigation*

In addition, the associated Library Research Guide ([http://libresources.wichita.edu/BIO210L](http://libresources.wichita.edu/BIO210L)) received 7740 views during Spring 2016-2017, providing evidence of its usefulness and application.
Analysis of Assessments

This assessment provides an early example of an ongoing project of developing curriculum-based library instruction and assessments with the General Biology I (BIOL 210L) course laboratory content. The point-bearing biology department assignments have been a consistent assessment tool, adding a Library Laboratory Review offers WSU Libraries Research & Instructional Services Group outcomes assessment and reflective student feedback on information literacy instruction. I am working to retrieve statistics on previous BIOL 210L library workshop assignments re: completion percentages and average grades, which will assist in demonstrating the significance of curriculum-based point-bearing integrated library instruction.

The iterative redesign of instruction and assignments moving from discrete skill-based steps and performance toward student comprehension, conceptual and processual understanding, and relevant applied learning with mixed assessments of classroom participation, qualitative responses and a quantitative series of project-based assignments provide more robust evidence of student understanding and successful learning application.

The format of voluntary “minute-paper” style open-answer assessment for this initial library instruction assessment tool avoids the drawbacks of multiple-choice quizzes (guiding answers, limited suggestion responses) or graded posts (constrained performance or anxiety) by enabling free reflective assessments by students who select to participate.

It is predicted that integrating library instruction with ongoing semester project assignments increases the percentage of completion of Library Workshop assignments. The percentage of completion of the 2016-2017 assignments (93%) and average grades of 4.6/5 provide evidence for the impact of curriculum-based library instruction and applied learning design.

The responses given to the Library Laboratory Review give strong evidence to the accomplishment of Library Instruction learning objectives as well as the impacts of library instruction on student learning. These responses also provide strong evidence of the Library Instruction Program’s fulfillment of ACRL Standards for Information Literacy for Higher Education. The responses related to further questions support the essential learning points and objectives and inform future iterations based on student report and need.

As the assignment and instructional design have developed over the past years, both students and instructors have expressed satisfaction, particularly regarding clarity, understanding, relevance, and equity of grading across multiple sessions and instructors.

Currently we are working with the Biology Department to tier information literacy and library resource instruction across the curriculum, where instruction may be broken up by modules and levels from undergraduate to graduate students according to advancement of research need and projects rather than front-loaded to one laboratory section in the early stages of their student careers. Spring of 2018 features library instruction in Biology Seminar Series (undergraduate/graduate); BIO 370 (Introduction to Environmental Science); CHEM 664 (Biochemistry II); BIO 661 (Pathogenic Microbiology); and EEPS 721 (Current Issues in Global Environment).