Collaborating with Faculty to Create a Lesson Plan Highlighting Research as Inquiry

Kelli Trei: Biosciences Librarian and Assistant Professor, University of Illinois at Urbana-Champaign
Overview of project

The class was “Mastering the Scientific Literature”

• Audience
  • Life sciences elective course
  • Undergraduates, junior or senior
  • Planning to attend graduate school

• Goals of One Shot
  • Defining a research hypothesis
  • Finding information to support that hypothesis
  • Storing that information
Tie Things Together

• 2013
  • Professor came to librarian
  • Professor created homework with input from librarian
• 2015-2016
  • Really thinking about the reason behind what we are doing in terms of learning theory
  • Thinking about how the new ACRL Framework is interrelated
Overview of Lesson

• Student Completes Pre-assignment
  • Created by professor under advisement from librarian
  • Librarian read and comments on all assignments but does not return yet

• Librarian conducts class session using assignments as example
  • Boolean searching
  • Modeling databases
    • Matching databases to topics in assignments
  • Iterative searching
  • Staying up to date with resources
  • Organization of citations

• After Class
  • Librarian and Professor return assignments with feedback
  • Student revises based on class and feedback and turns in again
Syncing to Learning/Teaching Theory

Cognitive Constructivism

- Actually a combo of theories by John Dewey, Jean Piaget, Lev Vygotsky, and Jerome Bruner
  - Generally speaking it is related to how knowledge is actively created

  - Established 4 criteria to use when designing a lesson using cognitive constructivism
    1. eliciting prior knowledge
    2. creating cognitive dissonance
    3. application of new knowledge with feedback
    4. reflection on learning
ACRL Framework
Frame: Research as Inquiry

Research is iterative and depends upon asking increasingly complex or new questions whose answers in turn develop additional questions or lines of inquiry in any field.

Knowledge Practices

• formulate questions for research based on information gaps or on reexamination of existing, possibly conflicting, information;
• determine an appropriate scope of investigation;
• deal with complex research by breaking complex questions into simple ones, limiting the scope of investigations;
• use various research methods, based on need, circumstance, and type of inquiry;
• monitor gathered information and assess for gaps or weaknesses;
• organize information in meaningful ways;
• synthesize ideas gathered from multiple sources;
• draw reasonable conclusions based on the analysis and interpretation of information.
ACRL Framework
Research as Inquiry Frame

Dispositions
• consider research as open-ended exploration and engagement with information;
• appreciate that a question may appear to be simple but still disruptive and important to research;
• value intellectual curiosity in developing questions and learning new investigative methods;
• maintain an open mind and a critical stance;
• value persistence, adaptability, and flexibility and recognize that ambiguity can benefit the research process;
• seek multiple perspectives during information gathering and assessment;
• seek appropriate help when needed;
• follow ethical and legal guidelines in gathering and using information;
• demonstrate intellectual humility (i.e., recognize their own intellectual or experiential limitations).
Student Pre-Assignment

Answer these questions describing the area of research you would most want to conduct in graduate school. Be as detailed as possible in your responses.

1. Discipline:  
   Subdiscipline(s):  
   Targeted Subject Areas:  
   Specific Research Questions:

2. Devise a set of search terms.

3. List the databases and search engines you will use.

4. How will you organize your information?
In Class

2-3 students present on their findings from pre-assignment

Using presentations as jumping off points the librarian models:

• Boolean searching in databases
  • Up to three databases specific to research interests of the students.
    • e.g. Scopus, PubMed, Web of Science, Google Scholar

• Limitations and strengths of databases selected
  • Coverage and Facets

• Fine-tuning the search
  • Terms, citation strings, etc

• Options for saving and organizing gathered information
  • Setting search alerts within the databases
  • Citation management software
1. Eliciting Prior Knowledge
   • This criteria is met with the use of a pre-assignment to gauge what the student already knows and how they apply that knowledge to specific questions.

2. Creating Cognitive Dissonance
   • This criteria is met by challenging the ideas the students had from their pre-assignment and highlighting new and better options during the presentations and class discussion.

3. Application of New Knowledge with Feedback
   • This criteria is met when we discuss the problems students may have had in each section of their assignment and, with instructor, librarian, and peer feedback, we conduct example searches to solve those issues with our newly developed skills.

4. Reflection on Learning
   • This criteria is met when the students revise the pre-assignment and submit it having applied the new information they have learned to the questions.
Examples of Research As Inquiry as Applied

Knowledge Practices

- Formulate questions- Pre-assignment
- Appropriate scope- Pre and post-assignment
- Breaking complex questions into simple ones- Pre-assignment, in class, post assignment
- Various research methods- In class
- Assess- In class, post-assignment
- Organize- In class
- Synthesize- In class, post-assignment

Dispositions

- open-ended exploration
- developing questions
- New investigative methods
- Critical stance
- Persistence, adaptability, flexibility
- Seek multiple perspectives
- Ask for help
Example Pre and Post Work

**Discipline:** Plant Biology  
**Subdiscipline:** Ecological genetics, Mycology, Community Ecology  
**Targeted Subject Areas:** Colonization, Mutualism, Rhizobia  
**Specific Questions:**  
- Are there shared genes among the symbiotic organisms?  
- How do these symbionts evolve with the host?  
- What happens if the host plant stops allocating nutrients to symbionts?  
- What happens to the symbionts when the plant undergoes above ground stress?  
- Can the mutualistic symbionts become parasitic?  
- Can the plant become oversaturated with symbionts? How does it control the abundance of symbionts?

**Search Terms:** Partridge Pea, Rhizobia, AMF, Mutualism, Nitrogen, Phosphorus, Herbivory, Shared Genetics, Colonization, Nodules, Arbuscular  
**Database & search engines:** I use Google Scholar and Web of Science to search for literature. I search for a few key words then read the abstracts to see if I am interested in the article. I also pick up on more keywords that show up in the abstracts.  
**Organization:** When I find literature I am interested in saving I will add the title, authors, and year to a google doc.

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- Can the plant become oversaturated with symbionts?  
- How does the plant control the abundance of symbionts?

**Search Terms:** *Chamaecrista fasciculata* (Partridge Pea), Rhizobia, *Arbuscular Mycorrhizal Fungi*, Mutualism, Nitrogen, Phosphorus, Herbivory, Shared Genetics, Colonization, Nodules, belowground, inoculation,  
**Database & search engines:** I use Google Scholar, Scopus and Web of Science to search for literature. I search for a few key words in the databases using the Boolean method. Then, I will read the abstracts of articles that come up to see if I am interested in the article. I also pick up on more keywords to use in searches that show up in these abstracts.  
**Organization:** When I find literature I am interested in saving I will add them to my Refworks folder with a sentence or two to remind me later what the article was about. When I want to use my literature for references in my papers then I can easily retrieve it from my folder in any format necessary.
Example Pre and Post Work

Research as Inquiry:
“Novice learners acquire strategic perspectives on inquiry and a greater repertoire of investigative methods.”
Always Iterative!

• What changed?
  • Dropped topics
    • Open access discussion, predatory publishers
    • RSS feeds
    • Journal rankings
    • ILL
    • Plagiarism
    • defining peer-review in publishing
  • Added Topics
    • Student Presentations
    • Google Scholar, if people were going to use it we wanted to help them use it better.
    • Organization options, citation management more broadly.

• What we still need to change?
  • Still a bit too long.
  • Anything based on what we learn!
Bibliography


If you liked this!
Upcoming ACRL book with this lesson plan (in entirety) and many other examples of using the framework:


Thank you!
Contact:
ktrei2@illinois.edu
217-244-2503