Modeling the Research Process in the Natural Sciences: Searching and Documenting Relevant Scholarly Sources

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Our Programs

Biological Sciences 202
- Pedagogy and Learning Outcomes
- Students
- TAs
- Supplemental Instruction Leaders, and Discipline-Specific Tutors

Library's Information Literacy Program
- Libraries provides leadership on campus for integrating information literacy skills in the classroom, course, and program levels.
- Libraries collaborates with faculty to create instructional interventions in multiple modes.
- ACRL Standards and Framework for Information Literacy for Higher Education and UW System Shared Learning Outcomes based on AAC&U LEAP initiative.
- 12 Librarians, 500+ instruction sessions, courses in most schools & colleges, highest impact in first year research & writing course

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The Task

Essential to successful learning in the sciences is the ability to locate, assess, and document appropriately relevant scholarly sources.

Introductory courses lay foundation for general writing skills that do not address specifically the conventions and motifs of writing and thinking in the sciences.
The Hope

Students will come to view information searches and documentation as an integral part of the learning process.

Ulcer Bug Case Resolution Template

This case study focuses on the process of scientific inquiry. The main theme is how the process of scientific inquiry allows us to evaluate research that we did not do ourselves and put into proper perspective.

In addition to the information in the case presentation (including the websites contained in the case itself), report the other resources that you used to learn more about the main questions in this research, the place of this article within the field, and the acceptance by the community of scientists of the conclusions in this article. Almost all of your outside resources should be original, peer-reviewed clinical and/or research papers. Abstracts alone are insufficient.

Be sure to provide specific, complete references to the original research articles that you cite (to learn the proper format for listing references, check on the course B2L page or see a summary here: https://writing.wisc.edu/Handbooks/DocCSE_NameYear.html).

A cited reference search might be helpful in this step of the resolution.
Your Programs

- Do you support information literacy in the natural sciences?
- Top 2 info lit struggles for students in the natural sciences?
- What’s the gap between faculty and student info lit skills?
The Challenges - 1

The smallest of three lecture sections in a typical fall semester.
The Challenges - 2

Student assumptions about how to find and cite information is not in alignment with faculty expectations.
The Challenges -3

- Case Studies require students to transfer and apply knowledge in a different context.
- Take-home assignments are scaffolded in sequences from descriptive/comparative to application/analysis to analysis/synthesis in subsequent assignments.
- BOTH sets of assignments require students to locate, extract, and document information from the scientific literature.
Applying a Scaled and Iterative Approach

- **Library Course Guide**
  - Scaled Delivery of Information Literacy

- **Library Research & Citation Worksheet**
  - Scaffold Information Literacy

- Improvements to [Citation Guide](#) and Worksheet
  - Citation Barriers – Digital Literacy

- Revise to Improve Transference
  - Reduce Student Cognitive Load – Increase Self-Assessment

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Initial Assessment – examining the data

Overall, this was a successful assignment. In all semesters, at least 94% of students who attempted it, completed it properly.
Continual Assessment – responding to the data...and to the students

Students *did*, however, report some confusion in the assignments.

The confusion also manifested itself in the inconsistent application of the skills and practices as students were required to transfer these lessons to their course assignments.

In particular, there were 3 areas of weakness:

1. Appropriate reporting and formatting of in-text citation (including for direct quotation)
2. Appropriate recording and formatting of end references
3. Appropriate identification of literature sources: distinguishing between primary research or disciplinary review literature and other, non-research resources.
Continual Assessment – responding to the data...and to the students

**ACADEMIC LITERACY**

“I didn’t know there’s a library guide.”
“Could you proofread my citations?”

**DIGITAL LITERACY**

“What is html and DOI?”
“I don’t understand my professor’s feedback, can you interpret it for me?”

**INFORMATION LITERACY**

“Why do I have so many search results?”
Responding to the students

Citation Styles: Citation Styles
A comprehensive guide to citing in various citation styles, offering examples of citations as well as links to outside sources.

Reading Citations
- article title or chapter title
- periodical title or book title
- author(s) or editor(s)
- place of publication
- date of publication
- publisher name
- volume/issue (articles) or edition (books)
- page range
- Medium of Publication
- electronic access (URL or DOI)
- Date Accessed

Article landing page:
- Article Title
- Journal Title
- Authors
- DOI
- Volume, Issue
- Page Range

Qualitative Assessment of the Commodity Risk for Spread of Foot-and-Mouth Disease Associated with International Trade in Deforested Beef

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<table>
<thead>
<tr>
<th>Feature</th>
<th>Score</th>
<th>Feature</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal or professional organization as author (not anonymous)</td>
<td>1</td>
<td>In-text citations with full reference list?</td>
<td>1</td>
</tr>
<tr>
<td>2 pages or fewer?</td>
<td>0.5</td>
<td>'Pull quotes' and highlights?</td>
<td>0</td>
</tr>
<tr>
<td>Tables, charts, figures; statistical analysis, math?</td>
<td>1</td>
<td>Section 'for further reading'?</td>
<td>0</td>
</tr>
<tr>
<td>Topical or IMRAD headers?</td>
<td>1</td>
<td>Text boxes with definitions of terms</td>
<td>0</td>
</tr>
<tr>
<td>Identified as 'patient advice', 'commentary', or news?</td>
<td>0</td>
<td>Total Score</td>
<td></td>
</tr>
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Total Score: #infolitbiosci @ganski1
<table>
<thead>
<tr>
<th>If the article's total score is ...</th>
<th>Then ...</th>
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<tbody>
<tr>
<td>3.5‒5</td>
<td>You very likely do have selected a scholarly research or review article that is suitable as a foundation for your research. You may add this to your reference list.</td>
</tr>
<tr>
<td>1.5‒3</td>
<td>You might have selected a scholarly research or review article that is suitable as a foundation for your research, but it is not very likely. You should look into it more; seek help if you cannot decide.</td>
</tr>
<tr>
<td>0‒1</td>
<td>You very likely have selected a news, commentary, or other article that is meant to give information, but is not itself a scholarly research or review article suitable as a foundation for your research. You need to find another resource for your reference list.</td>
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</tbody>
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In our second and third revisions of the assignment, we also examined the number of attempts required to succeed.
Continual Assessment – responding to new data...and to the students
Continual Assessment – responding to new data...and to the students
Future Actions

Target in-text citation styles and formatting.
- More explicit modeling or examples in on-line workshop exercise?
- Identify elements of citation before creating citation


Key word look-up and search
- Model initial searches to reduce cognitive load
- Focus student decision making on refining the search


Additional guidance in cited reference searching
- Practice iterative searches?
- Incorporate reflection on decision making

Future Actions -1

Task 3: Documenting Your Sources

3.1 Review: Citation Styles [http://guides.library.uwm.edu/citationstyles](http://guides.library.uwm.edu/citationstyles).

Record the following information for your article summarized in task 2.3.

Author: _____________________
Year of Publication: ____________
Article Title: _________________
Journal Title: _________________
Volume & Issue Number: __________
Page numbers: _________________
Future Actions - 2

2.1 Watch **How do I search?** Goal: Create a successful search strategy.
Perform the following search: antibiotic resistance AND causes

2.1.1 Record the number of results returned: ________

Now **refine** your search. Watch: **How do I edit my search results?** Goal: Utilize facets to improve your search results

2.1.2 **Show Only** Peer Reviewed journals.
Record the number of results returned: ________

2.1.3 Select the **Topic: Antibiotic Resistance** from the left side facets.
Record the number of results returned: ________

What can you learn from how these sources are described?

2.1.4 Record one additional strategy for refining your search. ________________
Record the number of results returned: ________

Why did you choose this strategy?

If you had more time, what other strategy would you try?
Future Actions - 3

4.3.3 Now, read both articles and compare the two. Why would scientists be using the article you recorded in task 4.3.1 so many more times than the article you recorded in task? List 3 reasons:

Reason 1:
Reason 2:
Reason 3:
Discussion

Responses, reactions, questions, comments, experiences to share?

How can we best bring students into the scaffolded assignment design to help with transference?