The Planning Stage: A Research Strategy

CHEM 23201
Fall 2019

1. Pick up the handouts
2. Hand-in assignment #1
3. Download in-class activity from course page

Overview

- Call Numbers
- Publication Types
- Research Strategy
- Practice

Podcasts & Articles

- Due next week
  - Be prepared to discuss

CALL NUMBERS

Library of Congress Call Number Classification

- Q - Science
  - QA – Mathematics
  - QA76 Computer Science
  - QB – Astronomy
  - QC – Physics
  - QD – Chemistry
  - QD146 - 197 Inorganic
  - QD241 - 441 Organic
  - QH – Biology
  - QT – Physiology
- R – Medicine
  - RS – Pharmacy
- S – Agriculture
- T – Engineering
  - TA – Civil
  - TJ – Mechanical
  - TK – Electrical
  - TN – Mining
  - TP – Chemical

Reading a Call Number

- Raman/Infrared Atlas of Organic Compounds
  - By Bernhard Schrader
- Dictionary of Inorganic Chemistry
  - J.E. Macreyes, Editor

Subject: Organic Chemistry - organic analysis - special methods - spectrum analysis
Subject: Inorganic Chemistry - Dictionaries and encyclopedias
Title: Dictionary...
Year published
Year published
Classifying Publication Types

• Original Research
  • Lab Notes or Observations

• Primary
  • Reporting original research

• Secondary
  • Organizing & summarizing primary literature

• Tertiary
  • Guides to the literature

Publications Types

• Abstracts
• Almanacs
• Books
• Dictionaries
• Dissertations
• Encyclopedias
• Guides to the Literature
• Handbooks

• Indices
• Journals
• Newspapers
• Patents
• Preprints
• Proceedings
• Technical Reports
• Theses

Publication Type Timeline

<table>
<thead>
<tr>
<th>Day of Event</th>
<th>Weeks after Event</th>
<th>Months after Event</th>
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<td>Lab Notes</td>
<td>Preprints</td>
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<td>Handbooks</td>
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Key:
- Original Research
- Primary
- Secondary
- Tertiary

Research strategy

1) Background work
2) Get as many results as possible
3) Focus your results
4) Evaluate the results, redo your search if needed

A Research Strategy

For 21st Century Tools
Research Strategy

Background work

- Encyclopedias
- Dictionaries
- Handbooks
- Trade magazines
- Newspapers
- Talking to experts

Summarize your Topic

- Clearly & concisely state your topic
- It may help to put it in the form of a question
- Add comments
  - I don’t want to include...
  - I need to include research from...

Key Concepts

- Identify a minimum of two concepts
- Concrete & unambiguous as possible
- Prioritize them
- They are usually nouns, sometimes verbs
- They can be a single word or a phrase

Done for you:
Stemming & Lemmatization

- Stemming
  - Computer algorithm
  - Looks for the root word by cutting common suffixes
  - For example:
    - -ing, -ed, -s or -es, -ation, etc.

- Lemmatization
  - Computer algorithm
  - Resolves words to their dictionary form
  - For example:
    - Am, are, and is would be resolved to "be"
Tools for your use:
Boolean Operators

• AND (must have all search terms)
  • Ex: inhibitor AND enzyme

• OR (must have at least one of the search terms)
  • Ex: corn OR maize

• NOT (excludes a search term)
  • Ex: integration NOT school

Tools for your use:
Parentheses: two reasons

• Group synonyms from the same concept
  • (corn OR maize OR cereal OR cbh351)
  • (lunch OR dinner OR “mid-day meal”)

• Override internal order of Boolean Operators
  • ((pig NOT swine) OR poultry) AND antibiotics
  • Race? AND ((cycle OR bicycle) NOT motor*)

Tools for your use:
Truncation

• Single letter (0 or 1 letter)
  • Chemical?
    • Chemical, Chemicals

• Multiple letters (0, 1, or more letters)
  • Chem*
    • Chemic, Chemical, Chemistry, Chemists, etc.

• Left
  • $organic
    • Bioorganic, Inorganic, Bioinorganic, etc.

Art of Truncation
Goal: Get EVERYTHING you want and NOTHING you don’t want

• Key concept: catalyst

  • Don’t truncate
  • Catalyst* =
  • Catalys* =
  • Cataly* =
  • Catal* =
  • Cata* =

Art of Truncation
Goal: Get EVERYTHING you want and NOTHING you don’t want

• Key concept: catalyst

  • Don’t truncate
  • Catalyst* = catalyst, catalysts
  • Catalys* = previous line + catalysis, catalyse
  • Cataly* = previous line + catalytic, catalyze, catalysotype, etc.
  • Catal* = previous line + catalogue, catalase, catalan, Catalonia, catalog, cataluminescence, Catalina, catalepsy, etc.
  • Cata* = previous line + catastrophe, catalyismic, catacomb, etc.
Tools for your use:
Wildcards

- Single letter
  - Wom?n
    - Woman, women
- Multiple letters
  - Phosphor??s
    - Phosphors, phosphores, phosphorous, phosphorus
  - Lab*r
    - Labour, labor, labrador, labeler, etc.

This is up to you:
Synonyms & Related terms

- Think of different ways someone might express each concept:
  - Synonyms
  - Alternative spellings
  - Variant endings
  - Variant beginnings
  - Acronyms
  - Narrower terms
  - Broader terms
- Use encyclopedias, dictionaries, handbooks

Summary:
Ways to get a lot of results

- Database supplied
  - Stemming
  - Lemmatization
  - Boolean Operator – OR
    - Use parentheses
  - Truncation
  - Wildcard
- From you
  - Synonyms
  - Related terms

Research Strategy
Focus your results

Tools for your use:
Boolean Operators

- AND (must have all search terms)
  - Ex: inhibitor AND enzyme
- OR (must have at least one of the search terms)
  - Ex: corn OR maize
- NOT (excludes a search term)
  - Ex: integration NOT school

Boolean Operator - AND

Ex – aspirin AND blood
**Boolean Operator - NOT**

Integration

School

Ex – integration NOT school

**Tools for your use:**

**Proximity – Any order**

- Any order
  - Fighting W/5 Irish
  - Fighting near/5 Irish
    a) WVFI Radio: The Voice of the Fighting Irish
    b) Born Fighting: How the Scots-Irish Shaped America
    c) Irish man fighting for life after fall from scaffolding in Australia

**Proximity – Exact order**

- Exact order
  - Fighting Pre/5 Irish
  - “Fighting * Irish”
    a) WVFI Radio: The Voice of the Fighting Irish
    b) Born Fighting: How the Scots-Irish Shaped America
    c) Irish man fighting for life after fall from scaffolding in Australia

**Phrases - Loose**

- Loose
  - “Scots Irish”
    a) Musical legacy of traditional Scots, Irish, and American folk music
    b) Born Fighting: How the Scots-Irish Shaped America
    c) Searching for your Scots Irish ancestors
  - Singular, plurals, variant word endings, & punctuation

**Phrases - Exact**

- Exact
  - (Scots Irish)
    a) Musical legacy of traditional Scots, Irish, and American folk music
    b) Born Fighting: How the Scots-Irish Shaped America
    c) Searching for your Scots Irish ancestors
  - Exactly what you typed

**Best way to get focused results**

- Add another concept from YOUR concept list
- DON’T rely on database supplied concepts
Summary:
Focus your results

- Database supplied
  - Boolean operator – AND
  - Boolean operator – NOT
  - Proximity
  - Phrases

- From you
  - Add another concept from your list

Research Strategy
Step 3: Did you get what thought you would get?

Examine results & Refine your research strategy

- Look at the first 10-20 search results

- Do you see any new synonyms or related terms?
  - Add them to your search
  - Repeat your search with new information added

- Did you get too many or too few results?
  - What is too many or too few?

25/250 Guideline

- Results under 25
  - Subtract a concept
  - Use synonyms or broader terms
  - System may consider your terms as a phrase
    - Use AND between concepts

- Results over 250
  - Add another concept
  - Use narrower terms
  - Search terms as a phrase
  - Limit by Review Articles

Conclusion

- Most important thing you can do to get better search results is to...
  - Identify your concepts
  - Identify synonyms & related terms of your concepts
  - Use concepts from your list
  - Evaluate the results

Practice