Supporting Data Use in Undergraduate Student Research: From Teaching Basic Data Literacy to Incorporating Data Documentation into Empirical Research Projects

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Supporting Data at a Liberal Arts College

➔ History and context
➔ Our influences
➔ Our approaches
➔ Future plans
Data Explosion

- Data explosion: Increase of data use in undergraduate research.
- Across all disciplines and subject areas
Data Research at Mac

- About Mac: highly selective liberal arts college w/ 2000 students
- No one librarian wears ‘data hat’
- From 'Q courses' to Data Science minor
  - Across disciplines new emphasis on data
- Data support: from finding to data management
  - Ambitious students
- Traditional support
  - Course-integrated, consultations
Influences

● Internal demands:
  ○ Increasing data integration into the curriculum (Hughes Grant)
  ○ Increasing faculty research needs
    (grant requirements, more awareness, digital scholarship)

● Staff development - learning more
  ○ conferences/ webinars/ workshops
  ○ Curricular projects: e.g. NECDMC
  ○ Project TIER
What we are doing to meet on-campus data needs

- Finding a Place for Data to Live on Campus: Digital Commons, our institutional repository
- Connecting with Grants Office: Providing faculty support for data mgmt planning
- Data-focused Instruction Sessions: Course-integrated sessions, workshops, consultations
- Data Modules: Online data best-practices resource

We'll be focusing on these support efforts in this presentation.
Supporting Data In Undergraduate Research:

**Instruction & Consultations**

**Instruction sessions**
Going beyond just finding data.
- Data-focused course integrated instruction
- Honors student sessions
- Summer science workshops

**Data consultations**
Identifying needs, finding data, proper citation, data management best practices
## Hands-On Activity

You will be doing research on water quality at Macalister’s Gradyway Nature Study Area. You have received the first file of raw data (January 2023) related to weather and water quality that has been collected by sensors/equipment located at Gradyway, and you expect to receive up to 24 additional data files similar to this one. Using information from the library’s data planning checklist provided below, start planning for your data and record the steps that you would take when planning for your research data.

1. **CREATE GOOGLE DOCUMENT:** Title the document ‘Session 3: Data’.
2. **SHARE THE DOCUMENT:** [email -- creategoogledocument, you]
3. **LIST YOUR NAME(S) AT THE TOP OF DOC**

Please respond to the following data planning questions on the Google doc that you created.

1. The first data file you received is a Microsoft Excel file. What file format will you use while working on your research? Once the project is completed and you will be archiving the data, what file format might you use?
2. You received a file named “datafile.xlsx” and it contains the Gradyway weather and water-quality data for January 2023. You expect to receive up to 23 additional files. What naming convention will you develop for the data file used in your research?
3. Since you obtained your data from other sources, what other factors might you need to consider when using the data?
4. How will you ensure that your data is safe from loss? Where will the data be stored?
5. How will you ensure usability of the data into the future?
Supporting Data In Undergraduate Research:

Creating Online Modules

- Library & ITS Committee
- Interactive and flexible
- Expanding beyond Social Sciences
- 'Macalesterize': Connect to our resources and services
- Identify topics to cover:
  - Module #1: Data Management Overview
  - Module #2: Finding & Collecting
  - Module #3: Sharing & Using
  - Module #4: Intellectual Property & Ethics
  - Module #5: Protecting & Storing
  - Module #6: Metadata
  - Module #7: Organizing
  - Module #8: Preserving & Archiving
Learning Objectives

Examples:

● “Students will cite sources of data and document processes of collecting data in order to communicate the origins of their data.”
● “Students will identify, locate, or create data appropriate to the question being addressed.”
● “Students will articulate the importance of preserving original data in order to recreate the study.”
Choosing A Platform

- Looked at variety of products
- Chose Google Slides
The modules in action:

**Introduction to Statistical Modeling**

Students were asked to go through our ‘Finding Data’ module and then complete a Google doc-based exercise answering questions about where they might find the needed data for their specific research project.

A librarian then gave feedback on their responses via the Google doc as well as suggesting possible other data sources they may want to check out.
The Move to LibGuides

- Rethinking our Platform
- Why LibGuides?
  - Staff access / edit
  - Ability to share content between modules
  - It's platform students and faculty are familiar
- Process of creation
- How’s it going?
- Take a look at the modules

Future Plans:
"Data Modules 2.0"

- Develop discipline-specific scenarios
- Add a glossary
- Create additional exercises for faculty
More Future Plans

- Course integration in the Fall
- Data Modules Assessment Plan
  - Survey students for usefulness of modules
  - Assess final projects for data practices using rubric
You can find our data modules at
http://libguides.macalester.edu/data1
if you'd like to follow the progress of our work.

Sources we mentioned in our presentation:

![PROJECT TIER](http://www.ProjectTier.org/)

The TIER Protocol (Teaching Integrity in Empirical Research) provides guidance to students conducting quantitative research to help ensure that their work is transparent and reproducible.

New England Collaborative Data Management Curriculum (NECDMC)

< http://library.umassmed.edu/necdmc/index >

An instructional tool for teaching data management best practices to undergraduates, graduate students, and researchers in the health sciences, sciences, and engineering disciplines.
Thanks for attending our session!

QUESTIONS?

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