# Flexible, scalable, and sustainable data literacy instruction - remote learning and collaboration for the future

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Ginny Boehme
Science Librarian

Kristen Adams
Science & Engineering Librarian

MIAMI
UNIVERSITY
OXFORD, OH • EST. 1809

# Data literacy - of growing importance

Not just important for graduate students or future researchers

Many of the fastest-growing occupations involve high levels of data literacy (US Bureau of Labor Statistics)

Many institutions (incl. Miami) have some form of quantitative reasoning or literacy requirement in general education curricula (Bourke et al, 2009), but ...

   ... preliminary observations from our own research: low levels of data literacy in junior & senior biology students

   ... rampant misuse/misunderstanding of COVID-19 data

# Miami University

Public institution w/ liberal arts focus

FTE:

   ~17,200 undergraduate (24% in STEM)
   ~2,500 graduate (majority STEM)

College of Arts & Science has QL
   requirement, but students only need
   one class (3 credit hours)



Image courtesy: Scott Kissell, Miami University

# Serendipitous Convergence - Fall 2019

Research Experience for Undergraduates (REU)

Miami Ecological Big Data Initiative (MiEBDI)

Campus-wide push for microcredentials

Increased interest in data-related library services

# Serendipitous Convergence (continued)

Research Experience for
Undergraduates (REU)

- NSF-funded program in ecology
- 10 week summer program
- Grant renewal (submitted summer 2019) added librarian-led data literacy instruction to existing information literacy instruction

# Serendipitous Convergence (continued)

Miami Ecological Big Data Initiative (MiEBDI)

- Research center in biology department
- Research data management (RDM) workshops/half-term class (low attendance/enrollment)
- Wanted to expand existing workshops & class

# Serendipitous Convergence (continued)

- Addition of data-related centers & programs necessitated expansion of existing library services
- Increased interest from liaison librarians

Increased interest in data-related library services

# Serendipitous Convergence (continued)

- Improve student job prospects/marketability
- Increase revenue by attracting new students & corporate partners

Campus-wide push for microcredentials

# Serendipitous Convergence (continued)

|  |  |
|---|---|
| Research Experience for Undergraduates (REU) | Miami Ecological Big Data Initiative (MiEBDI) |
| Campus-wide push for microcredentials | Increased interest in data-related library services |

# The Decision

Series of online (Canvas) modules

Designed to be standalone or taken together as a micro-course

Module topics based on Core Competencies for DIL

# Core Competencies for DIL

1. Intro to databases and data formats
2. Discovery and acquisition of data
3. **Data management and organization**
4. Data conversion and interoperability
5. Quality assurance
6. Metadata
7. **Data curation and re-use**
8. Cultures of practice
9. Data preservation
10. **Data analysis**
11. **Data visualization**
12. Ethics, including citation of data

*(Carson et al., 2011)*

# Topic Selection - Splitting Efforts

Four competencies selected to cover by team:

1. Data management & organization     *Beth Mette (MiEBDI staff)*
2. Data curation & re-use            *Matt Benzing (Librarian)*
3. Data analysis (incl. Intro to R)  *Ginny Boehme (Librarian)*
4. Data visualization                *Kristen Adams (Librarian)*

# Creating the Modules

Some previous knowledge and some learning as we went

Each module planned to involve ~4 hours to complete

Each incorporated multimodal instruction

Designed to be asynchronous and mostly self-guided / hands-off

# Struggles with hands-off instruction

Active learning in an asynchronous environment, with no instructor feedback/interaction:

- difficult to achieve
- not ideal
- *necessary*

# Outreach & marketing efforts

Created a PDF flyer with descriptions of each module

Emailed faculty we'd worked with in the past, including the MiEBDI group

Marketed as an online self-paced workshop, which would be available after summer for faculty to incorporate into their classes

Cultivated awareness of new teaching resource or partners

Recruited a mix of faculty, staff and graduate students to test it over the summer

# Summer testing



Test Usage - All Modules - Summer 2020

Page Views by Week
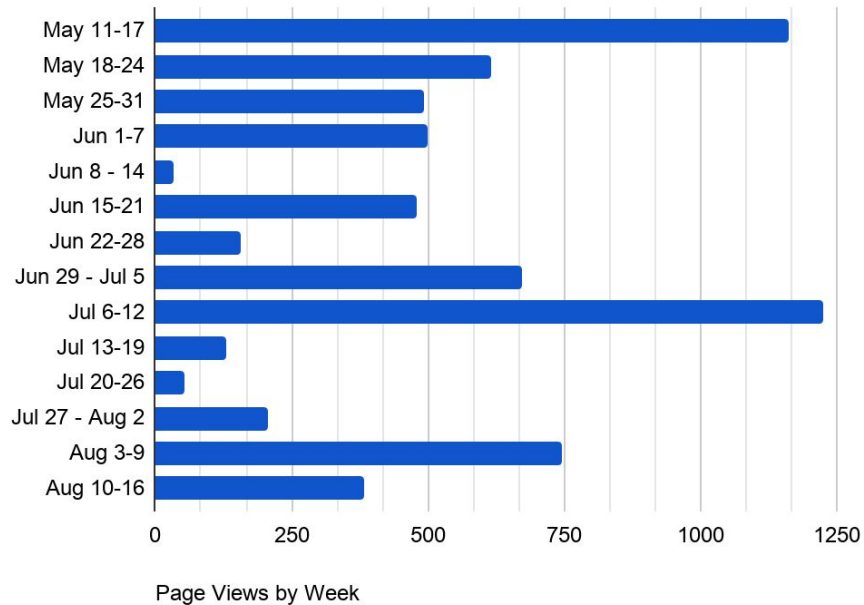
| Department | Learners |
|---|---|
| Biology | 11 |
| Chemical, Paper, BioMed. Engineering | 3 |
| Chemistry & Biochemistry | 4 |
| Economics | 1 |
| Geology | 2 |
| Library | 4 |
| Mechanical & Manufacturing Engineering | 2 |
| **Total** | **27** |

# Updates based on feedback

Feedback forms were added to the end of each module

    Length of time to complete

    Depth of content

    Format preference (videos, readings, quizzes, assignments, discussion posts)

Module 1 received one response and was updated; other modules received none

Intended to be a continual process, hope for future feedback

# Full implementation

Shared to Miami Canvas Commons, before fall semester started

Each module uploaded and downloaded separately

    Flexibility in use

    Ready at different times

    Each is attributed to their creator, for credit and questions

Emailed faculty to let them know the modules were available

Downloads to date (Sep. 17, 2020) is 14, for all modules combined

# Future Developments & Directions

# Microcredential

MU Libraries and others on campus developing microcredentials

     1 credit classes to be taken alongside other for credit courses

     Revenue generating

     Provides students opportunity to develop skills not offered in other courses

After use in fall 2020, hope to get feedback to improve modules and formally create a microcredential

     Administrative processes

# Canvas alternative

During summer marketing efforts, faculty with Project Dragonfly inquired about a Canvas alternative

PD is a graduate program for biology/ecology that is mostly online

Their students would benefit from the content, but don't use Canvas

There is much integrated into Canvas, such as quizzes, difficult to extract

Still investigating best route to make a non-Canvas option available

# Recommendations

# Recommendations

Don't bite off more than you can chew...
> Module 3 delayed due to learning everything from scratch and constant interruption by other priorities

Multimodal instruction keeps things engaging

Keep accessibility in mind!

If self-guided:
- Automatic grading/validation for quizzes
- Restrict discussion boards to not show replies until after submission

# References

Bourke, B., Bray, N. J., & Horton, C. C. (2009). Approaches to the Core Curriculum: An Exploratory Analysis of Top Liberal Arts and Doctoral-Granting Institutions. *Journal of General Education*, 58(4), 219–240. http://doi.org/10.1353/jge.0.0049

Carlson, J., Fosmire, M., Miller, C. C., & Nelson, M. S. (2011). Determining Data Information Literacy Needs: A Study of Students and Research Faculty. *Portal: Libraries and the Academy*, 11(2), 629–657. https://doi.org/10.1353/pla.2011.0022

Employment Projections program, US Bureau of Labor Statistics, https://www.bls.gov/emp/

# Thanks