

2022

Integrating Data Literacy into Lower Level Undergraduate Instruction

Emily Zoe Mann

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INTRODUCTION

While data has become more essential in academics, business and everyday life, in my job as an undergraduate instructional librarian I felt it was best left to experts. I previously worked at Florida State University Libraries as the Research and Instruction librarian, concentrating on undergraduate services. At Florida State University Libraries, as at many larger institutions, library data services tended to focus on graduate students and faculty. Services included data management, software and curation. These services were provided by content experts who I referred my patrons to whenever they needed data assistance. I have not taken a statistics class since high school and don't feel comfortable with math. I didn't think data literacy was something I needed to worry about. In 2019, I moved to the University South Florida St. Petersburg campus as the student success librarian. Shortly after starting I joined a faculty learning community examining data literacy in hopes of learning something new and getting to know faculty on my campus. In the process of doing so, I realized data literacy is an essential part of information literacy and something I could and should be teaching.

UNIVERSITY BACKGROUND

The University of South Florida St. Petersburg campus is a branch campus of the University of South Florida. The campus has around 5000 FTE and 85% of those students are undergraduate students. The campus has traditionally been a separately accredited university but consolidated with two other USF campuses in July 2020. Historically it served as a regional campus, often serving transfer students from local community colleges. In the past decade the school has been seeing more first time in college freshman and making changes to the campus to accommodate these students, including a Foundations of University Success class I will give details on later in this paper. As the Student Success Librarian, I focus on the needs of these lower level undergraduate students.

DATA LITERACY FOR UNDERGRADUATE STUDENTS

Data literacy is recognizing and understanding data types and formats, reading, interpreting and critically evaluating data and data sources, and integrating data into different contexts. This definition comes from the faculty learning community I took part in during 2019-20. During the LOEX 2020 online presentation on this topic, I used Poll Everywhere to survey my participants, asking which of these concepts they felt were most important for undergraduate students to understand. Their options were: recognizing and understanding data, interpreting and evaluating data, integrating data into different contexts, all are equally important, or other. Of the 46 participants, 31% answered that all of these concepts were equally important for undergraduate students to understand, and 28% felt that recognizing and understanding data was the most important concept for undergraduate students to grasp. Concepts suggested outside of this definition included finding data, understanding the practical day-to-day use of data and understanding that data can be manipulated. The results of this survey can be found in Image 1.

Image 1: LOEX 2020 Poll Everywhere results: What Concepts of Data Literacy do you think are the most important for undergraduate students to understand?
<Placeholder; Editors will place Image 1 here in final doc>

As more and more data are collected and shared, it's becoming more important for everyone to have at least a basic understanding of data. Teaching data literacy does not require you to be a statistics expert. Most disciplines have a statistics class required in their course of study; the role of the librarian is not to teach how to run statistical tests, rather it's to include data as a source of information that students will need to be able to find and understand. This means data literacy is an essential part of information literacy. I make a point to remind my students that I am not a statistics expert but rather an expert in information, and

that data is information. One point I try to make with students is that data is like any other information—you can't just trust it implicitly and have to look at it with a critical eye.

One example of the necessity of data literacy is brought up in Project Information Literacy's 2020 report, *Information Literacy in the Age of Algorithms*. The report has a lot of food for thought, but the idea that I connected to undergraduate students' needs is that personal data is collected from every internet user, and that data is fed into an algorithm that then decides what information is returned for that user's searches. This type of large-scale data collection is creating customized information feedback loops, i.e., our own personal echo chamber of search results. This is the kind of thing students need to be aware of: Data literacy is not just knowing how to find and read charts, it's empowering our students to understand why they might get a particular search result.

DATA LITERACY FACULTY LEARNING COMMUNITY

As mentioned, I took part in a faculty learning community that focused on data literacy. A faculty learning community (FLC) is a group of faculty from multiple disciplines that meets regularly about a shared topic. In the case of the Data Literacy FLC, we met monthly to talk about the data literacy needs of students and professors. This FLC was suggested by librarians but was a collaborative effort. Outputs from the FLC included a poster presentation at a local teaching symposium, preliminary data literacy competencies, and a data literacy toolkit. The data literacy competencies can be seen in Image 2. More about this experience can be found in the *Journal of Academic Librarianship* article "Exploring data literacy via a librarian-faculty learning community: A case study." After taking part in the FLC and realizing how essential data literacy is in information literacy, I began to think of ways I could integrate it into first year instruction.

Image 2: USF St. Petersburg campus Data Literacy Competencies

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DATA VISUALIZATION PROJECT EXAMPLE

As the student success librarian, I work with first year students during their Foundations of University Success class as well as their beginning composition course. I often see the same students twice in year and sometimes twice in a semester. The Foundations for University Success class had no research assignments connected to it but required the completion of four pre-class information literacy modules, a library information literacy session, a scavenger hunt, and an interview with a librarian. I decided to streamline the process and also introduce data literacy with an in-class project that required no math and engaged the students at the beginning of their academic year. To do this I used a flipped classroom approach: I had the students complete online modules on information literacy and data literacy before coming into class for the 45-minute session. I based the project we did in class on a 2016 book titled *Dear Data*.

Dear Data

Dear Data is a project that was done by two artists, Giorgia Lupi and Stefanie Posavec. They collected personal data about themselves weekly and then sent an artistic data visualization of that data as a postcard. The postcards were collected and are shared on their website www.dear-data.com and also in their 2016 book. I really liked this project because it showed that data that was similar could be collected and shared in very different ways.

In-Class Activity

In order to create an in-class activity, I thought about what data literacy competencies I wanted to cover and what learning objective I wanted to have my students achieve.

Competencies:

- 1) Interpret and critically evaluate data and their sources
- 2) Integrate and synthesize data into different contexts with other sources and prior knowledge.

Learning Objective:

Students will design a creative data visualization based on their audience's need and articulate why they made those choices.

For an introductory course, the idea of students creating something is advanced, but I felt that the students could realistically achieve this learning objective in a 45-minute class period. In order to meet this learning goal, I spend the first 15 minutes of class going over the two learning modules they did before class and then talk about the Dear Data project. I show the website and pass around the book. I then give the students 20 minutes to complete the activity. In the activity the students have two options—they can use provided USF data from the USF system factbook or collect their own data very quickly. The use of data that is relevant to the students is important because they have more buy-in to the activity when it involves them in some way, making data a little more relatable. They have 20 minutes total and I have them work in groups of two or three. I provide students with paper and colored pencils. The instructions for the two options I give can be seen in Table 1. We then spend the remaining 10 minutes sharing some of the visualizations along with an explanation of why they portrayed the data in the way they did. Finally, students have five minutes to fill out a post-class survey.

Table 1: In-class activity options

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The results from this activity have been very positive. Students are energetic in class and instructors have told me that they find the activity engaging and positive. Looking at pre-class and post-class surveys, students went from 43% saying they felt very comfortable using data in a paper or argument in the pre-class survey to 53% saying they felt the same in the post-class survey. Additionally, the students recognized data was something they used often with 32% saying they used data daily in the pre-class survey, compared to 52% saying the same in the post-class survey. This shows that while the flipped classroom with self-guided instruction is useful, talking about the subject further in class helps students have a better grasp on data literacy. Every group has been able to create a data visualization and articulate why they did so, and many are excited to share with the class.

CONCLUSION AND RECOMMENDATIONS

Data literacy is not something that should be saved for graduate students and faculty, because data is essential for basic information literacy. As demonstrated by the in-class activity example, it doesn't require Excel skills or statistics training. Rather, you can allow students to look at data in a new way and help them understand it's something they are already dealing with. Data literacy can and should be taught in one-shot classes. In particular, student success classes such the USF St. Petersburg campus class Foundations of University Success are a great place to introduce data literacy concepts as the students will already be getting the more traditional information literacy instruction in their composition classes.

REFERENCES

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Images for Tables and Images (Editor will put in body of the text later)

Image 1

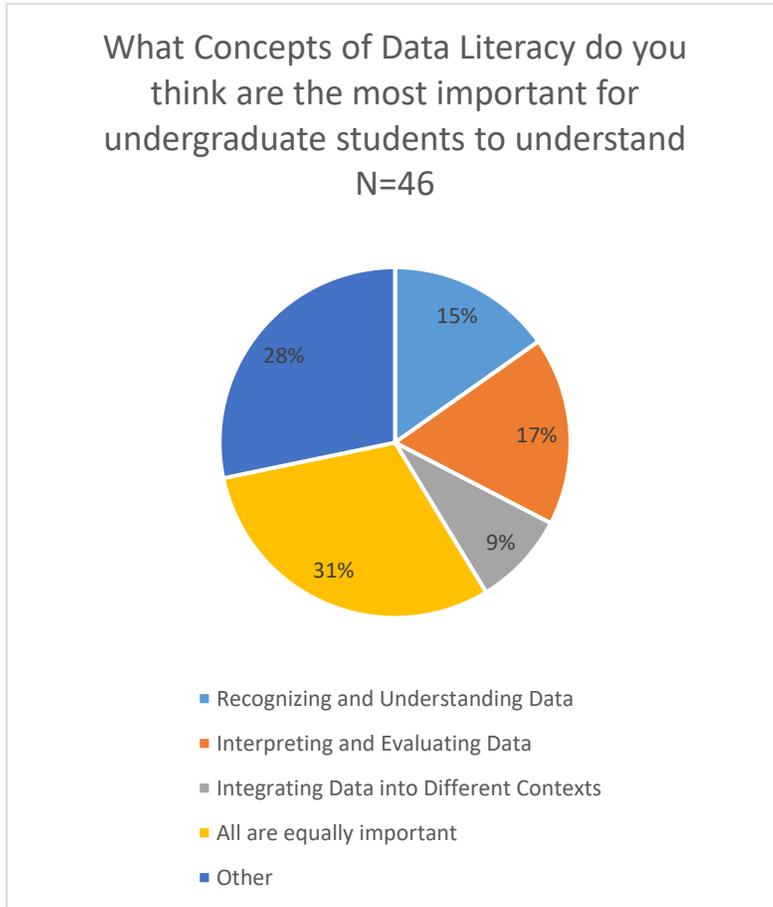


Image 2: USF St. Petersburg campus Data Literacy Competencies

General Undergraduate Education	<ul style="list-style-type: none">• Recognize how data is integrated into daily life & workplaces• Read and understand basic data types and formats• Interpret and critically evaluate data and their sources• Integrate and synthesize data into different contexts with other sources and prior knowledge
Undergraduate Research	<ul style="list-style-type: none">• Find, select, access, or *create datasets in order to:<ul style="list-style-type: none">- Test a hypothesis- Answer a research question• Ethically use/cite data• Communicate data effectively to different audiences, in part by using visualizations
Graduate Research	<ul style="list-style-type: none">• Data processing and wrangling• Data management and preservation• Metadata to meet data publication requirements

Table 1:

Option 1:	Option 2:
<ol style="list-style-type: none"> 1. Choose Partner 2. Choose Dataset within the USF system facts 3. Draw and explain Data, include data you used or link to it 4. Share with class and on shared Google sheet (include data and explanation) (Please only share to google sheets if you give permission for others to see your work) 	<ol style="list-style-type: none"> 1. Choose Partner 2. Decide on data to collect quickly in 5 minutes or less (clothing of classmates, flipping a penny, items in your backpack or bag, etc.) 3. Collect data 4. Draw and Explain Data, include data you use or link to it 5. Share with class and on shared Google sheet (include data and explanation) (Please only share to google sheets if you give permission for others to see your work)