



UNC GREENSBORO

University Libraries

Jo Klein GIS and Data Visualization Librarian

Megan Carlton Science Librarian

Two Birds One Stone:

Supporting data literacy and encouraging civic engagement using framework-inspired library programming.

- 1. Data literacy**
- 2. Civic engagement & citizen science**
- 3. The library's role**
- 4. Examples of library programming**

1

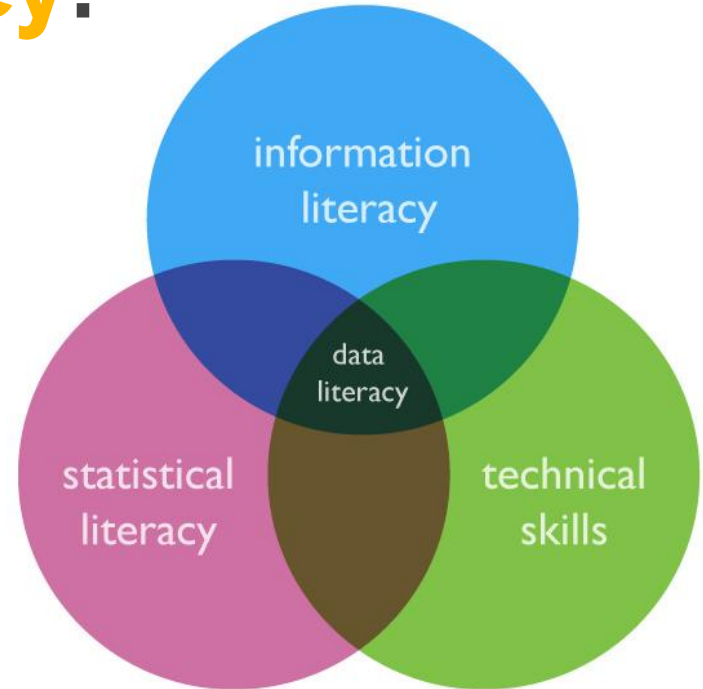
Data Literacy

What is **data literacy**?

The ability to consume for knowledge, produce coherently and think critically about data.

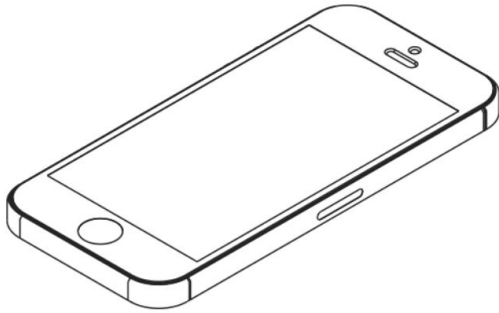
Historically relates to statistical and numerical fields.

Data information literacy (DIL) has a more expansive definition and concerns the activities of the data creator and consumer.



What does **data literacy** mean to you?

Go to **www.menti.com** and use the code **69 82 72**



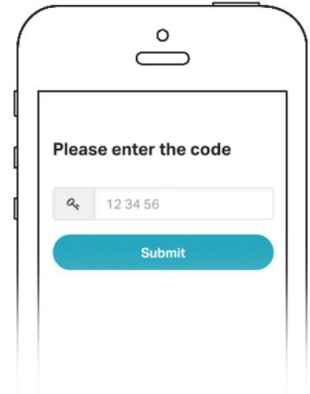
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Grab your phone

www.menti.com|

2

Go to **www.menti.com**



3

Enter the code **69 82 72** and vote!

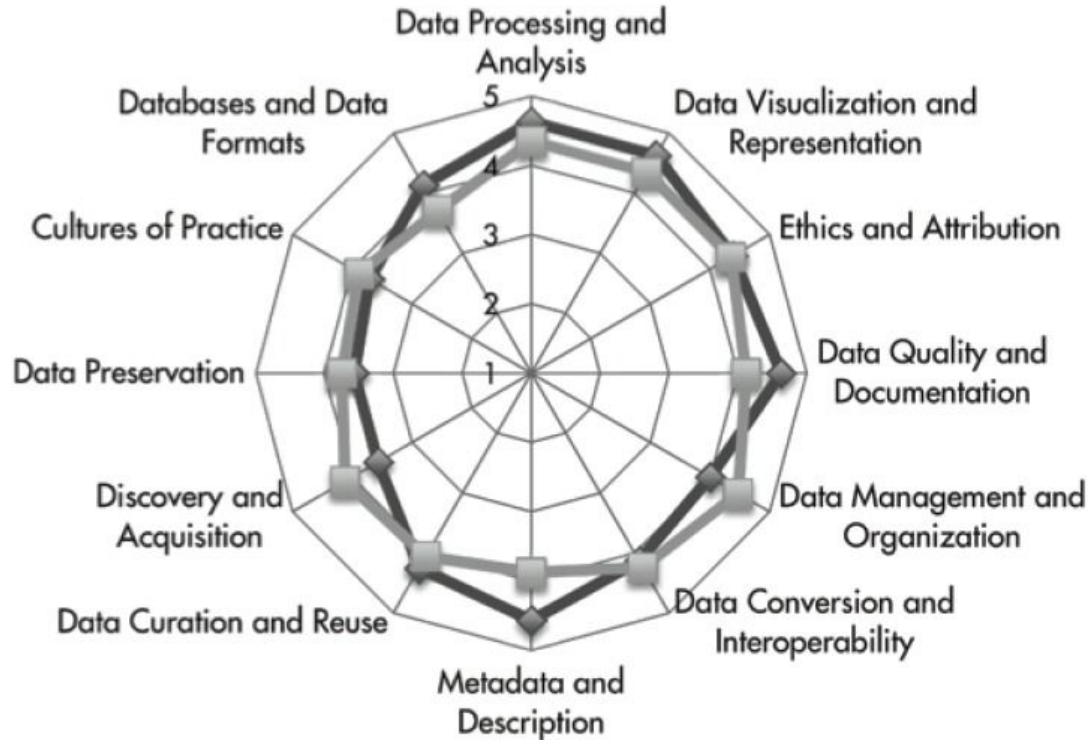


“A data literate person possesses the knowledge to gather, analyze, and graphically convey information and data to support decision making for quantitative and qualitative assessments and measurements (statistics).”

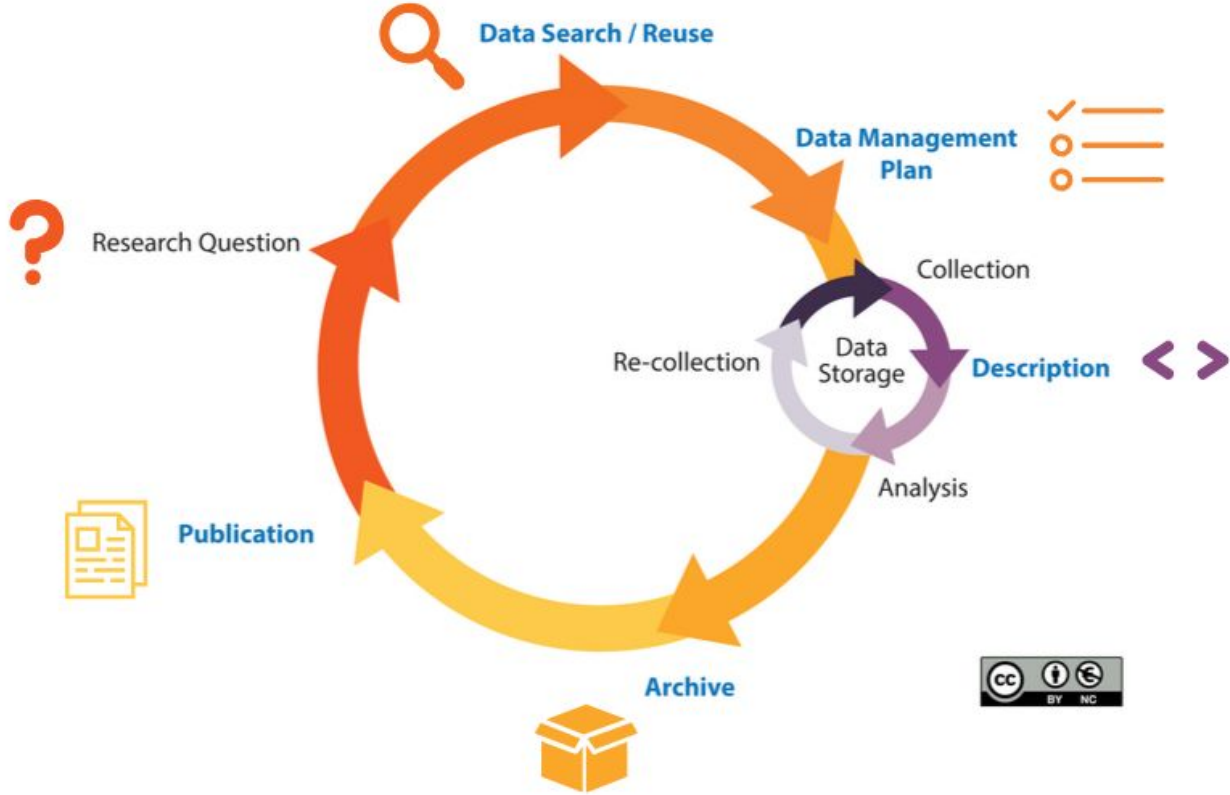
-kYmberly Keeton, Hip Hop LibGuide

The Importance of Data Literacy

◆ Average Ranking of Faculty (n = 8) ■ Average Ranking of Students (n = 17)



The Research Data Management Lifecycle



Adapted from the Research Data Management Lifecycle (diagram), Data Management LibGuide, University of California, Santa Cruz, viewed 26th July 2019 <<http://guides.library.ucsc.edu/datamanagement>>

Data Creation



Data Use



Using Data in **K-12 Programming**

- To prepare students to address real world complex problems;
- To develop students' ability to use scientific methods;
- To prepare students to critically evaluate the validity of data or evidence and of their consequent interpretations or conclusions;
- To teach quantitative skills, technical methods, and scientific concepts;
- To increase verbal, written, and graphical communication skills; and
- To train students in the values and ethics of working with data.

Incorporating Data Literacy in K-12

Some crosswalks exist connecting data literacy competencies to K-12 standards.

Data literacy competency	AASL/CCS
Ability to identify the context in which data are produced and reused (data lifecycle)	
Ability to recognize source data value, types and formats	1.2.3; 4.3.2
Ability to determine when data are needed	
Ability to access data sources appropriate to the information needed	1.1.4
Ability to critically assess data and their sources	1.1.4; 1.1.5; 1.1.7; 1.2.4; 2.2.2
Ability to determine and use suitable research methods	1.1.1
Ability to handle and analyze data	2.1.4
Knowing how to select and synthesize data and combine them with other information sources and prior knowledge	2.1.1
Ability to present quantitative information (specific data, tables, graphs, in reports and similar)	2.1.6; 3.1.4
Using data ethically	
Ability to apply results to learning, decision-making or problem-solving	2.3.3; 2.1.3
Ability to plan, organize and self-assess throughout the process	

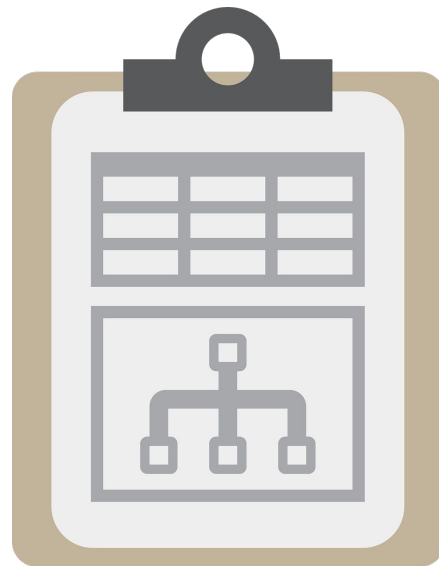
What data should you use?

NC Environmental Literacy Plan

- “Provide field experiences as part of the regular school curriculum...”

NC standards correlations available in:

- Project WILD
- Project WET
- Project Learning Tree



2

Civic Engagement & Citizen Science



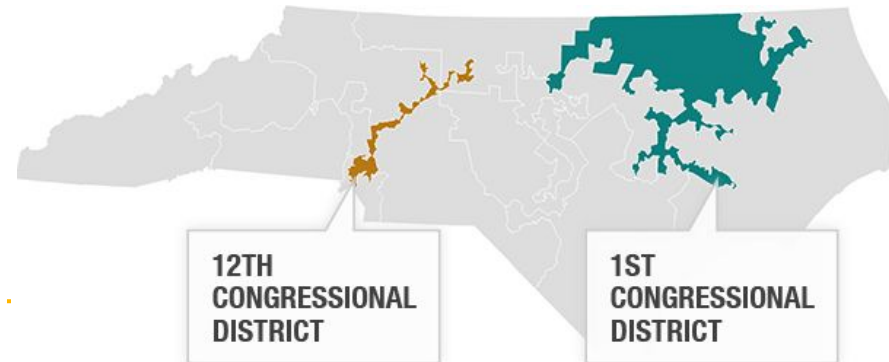
*“During these increasingly fractious times, strengthening the foundations of **civic engagement** — volunteering, voting, participating in civic and social organizations and engaging in activities that strengthen community and seek common ground — is particularly important.”*

-Urban Libraries Council, Leadership Brief: Libraries Leading Civic Engagement

Data Literacy & Civic Engagement

A data literate person can:

- Understand, interpret, and evaluate data from polls, surveys, the US decennial census, and other data sources
 - Including statistics and data visualizations
- Understand and interpret data about current events and community issues, including:
 - Climate change data
 - Health & environment data
 - Demographic data



“The public's limited knowledge in science, technology, engineering, and math (STEM) is a problem for scientific progress.”



Creates a gap between the scientific consensus and public belief

Citizen science projects are excellent for developing science-related skills:

- Identifying organisms
- Using measurement instruments
- Collecting field data
- Following protocols
- Process of research
- How scientific questions are asked and answered



3

Enter: the Library

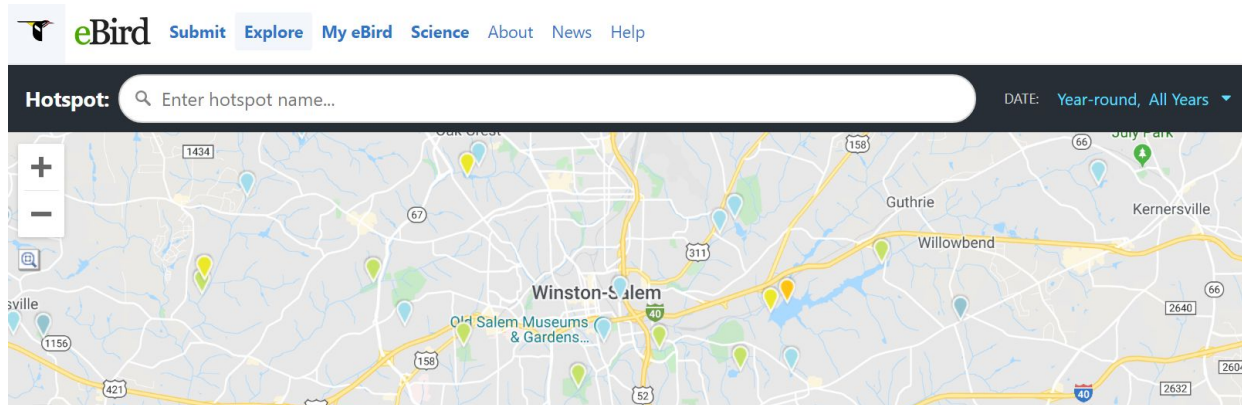
Why the **library**?

We are **informal educators**. These projects are a great way to engage people in learning science and data skills in a fun and meaningful way, while breaking down the barrier between the public and research and civics.

We are also **community hubs**. People come to libraries to access information and connect with their community. Often, we are the only point of access folks have to computers and the internet.

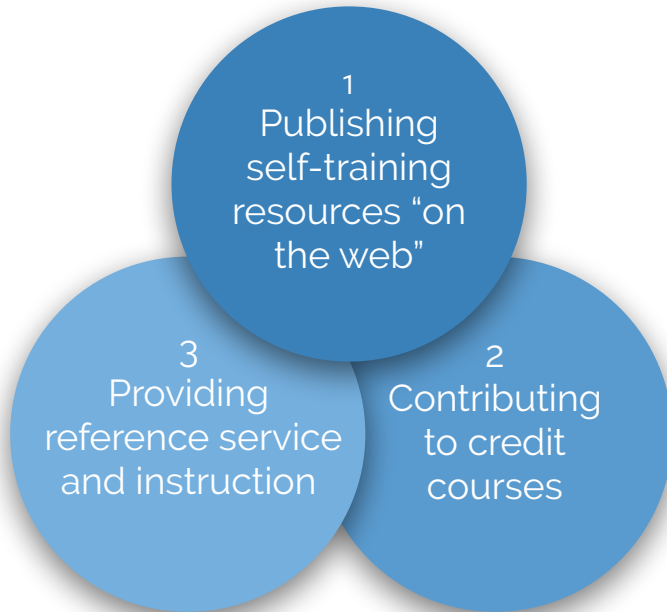
How do I do this at my **library**?

Provide opportunities for people to develop interest and engagement by either trying something new or by expanding previously existing interests. For example, when a bird watcher begins to report their bird sightings...



How do I do this at my **library**?

1. Pick an “Avenue”

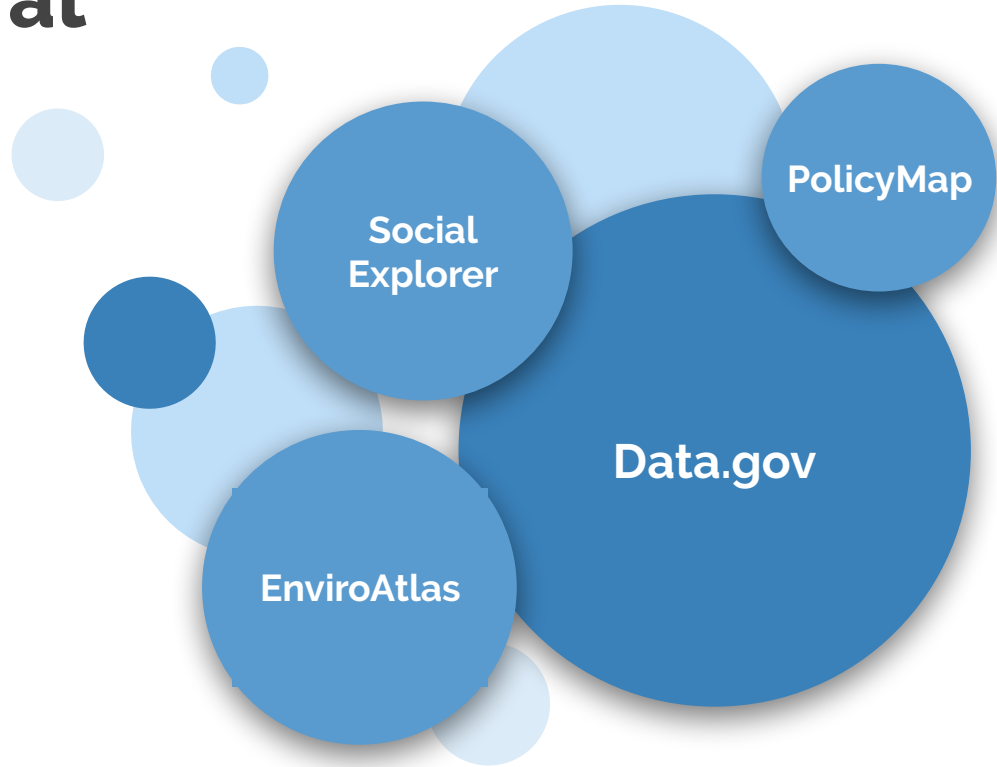


More examples:

- Online workshops and webinars
- Libguides
- Flipped learning websites
- Infographics & worksheets
- Workshops and boot camps
- Challenges, web-scraping, and other data-specific events
- Walking tours/events (geocaching & geospatial data)

How do I do this at my **library**?

2. Incorporate datasets & other resources



How do I do this at my library?

3. Engage & connect with community initiatives

 **FSU Libraries**
@fsulibraries



To celebrate Love Data Week, Adopt a Dataset! Find a Dataset to research and adopt. Share its name and something interesting about it using [#LoveData19](#) and [#ICPSR](#) for a chance to win prizes, including gift cards and FSU Library swag! bit.ly/2GD1pe4



♡ 10 11:25 AM - Feb 12, 2019

 See FSU Libraries's other Tweets

 **Libby Library**
@OOBLibrary



If you've got any questions about the 2020 US Census be sure to stop by today any time between 11 and 2! We'll have an info table set up here at the library where a Census taker will be to answer your questions!



♡ 2 10:01 AM - Oct 8, 2019

 See Libby Library's other Tweets

 **SLU Mammal Crew**
@SLUMammalCrew



Looking to master your mammal identification? Click the link to discover what lives in these northern New York State forests! [@NatureUpNorth #Zooniverse zooniverse.org/projects/barth...](#)



♡ 4 10:28 AM - Mar 28, 2019

 See SLU Mammal Crew's other Tweets

Examples of Library Programming

Citizen Science **Events & Challenges**

City Nature Challenge



Calling all nature (smart phone) lovers! Do you love Western North Carolina and all of its natural beauty? Do you find yourself taking photos of plants or animals that you encounter on your hikes? Do you love to WIN competitions while also supporting scientific research? Then join us for the 2019 City Nature Challenge!



The NORTH CAROLINA ARBORETUM



eco
EXPLORE



Endangered Data Week

University of Minnesota Libraries	Endangered Data, Data Ethics, and 'Vulnerable' Populations
University of Minnesota Libraries	FOIA for Scholarship and Publication
Michigan State University	Wikipedia Edit-a-thon: Michigan Superfund Sites
Michigan State University	Wikipedia Edit-a-thon: Michigan Superfund Sites
University of Nebraska at Omaha	Data Wrangling in R with the Tidyverse
 University of Melbourne, Sydney, ANU	PARADISEC
Boston College	Endangered Data Week: Introduction to Civic & Public Data
University of Montana	Endangered Languages as Endangered Data
The Claremont Colleges Library	Data Cleaning Workshop
University of Pennsylvania	Government Shutdown and Data

In-Class Instruction

Zooniverse: Planet Hunters

LESSON 4: EXOPLANET DETECTION

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In this lesson, students will first engage in an activity that offers an opportunity to use various methods of observation to identify an object without being able to directly observe it with their eyes. Next, students will be asked to research and present to the class one of the direct or indirect methods that scientists use to detect planets around distant stars. Detection methods covered include transit, Doppler, and direct imaging.

Supplementary Materials

- Stellar System Images 60
- Star Signage 61
- Detection Methods sheets 62
- Evaluate Other Systems homework 65

LESSON 6: USING PLANET HUNTERS

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This lesson acquaints students with the Planet Hunters (www.planethunters.org) citizen science project by researching its goals, learning about the project's science, and participating in the search for exoplanets. Students will watch a video tutorial that explains how the Planet Hunters website works, engage in analyzing light curves and look for possible transits that might indicate the presence of exoplanets.

Supplementary Materials

- Planet Hunters Star I.D. Chart 80



Lessons for Grades K-5



Aligned to the Standard Course of Study



Made for Teachers by Teachers

EPA Air Quality Curriculum



MODULE 1 - AIR POLLUTANTS AND THEIR SOURCES

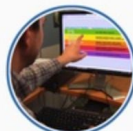
— MODULE 1 SUMMARY

7 activities and 4 videos covering the basic science of air quality including: properties of air, combustion, the criteria pollutants, local & regional pollution data, and detecting ozone and particulate matter.

+ 1-1 WHAT IS AIR?

+ 1-2 COMBUSTION & COMBUSTION EQUATIONS

+ 1-3 PARTS PER MILLION



MODULE 2 - PREDICTING AIR POLLUTION

— MODULE 2 SUMMARY

3 activities and 1 video exploring the science of predicting air pollution including: the air quality index, developing a model to predict ground-level ozone, and air quality monitoring forecasting.

+ 2-1 WHAT'S AN AIR QUALITY INDEX?

+ 2-2 MAKING A SIMPLE PREDICTIVE MODEL FOR GROUND-LEVEL OZONE POLLUTION

+ 2-3 FORECASTING AIR QUALITY



MODULE 3 - AIR POLLUTION PROBLEMS AND SOLUTIONS

— MODULE 3 SUMMARY

5 activities and 4 videos introducing possible solutions to our air quality problems including: scientific research, personal energy and driving choices, technology solutions, energy efficiency, alternative energy, regulations.

+ 3-1 SCIENTIFIC LITERACY AND AIR QUALITY

+ 3-2 INTRODUCTION TO SOLUTIONS & HOME ENERGY CHOICES

3-3 DRIVING CHOICES & CALIBRATING CAR

Workshops & Self-Guided Learning

Data Carpentry

Getting Started

Data Carpentry's teaching is hands-on, so participants are encouraged to use their own computers to ensure the proper setup of tools.

These lessons assume no prior knowledge of the skills or tools.

To get started, follow the directions in the "Setup" tab to download data to your computer and follow any installation instructions.

Prerequisites

This lesson requires a working copy of **R** and **RStudio**.

To most effectively use these materials, please make sure to install everything *before* working through this lesson.

For Instructors

If you are teaching this lesson in a workshop, please see the [Instructor notes](#).

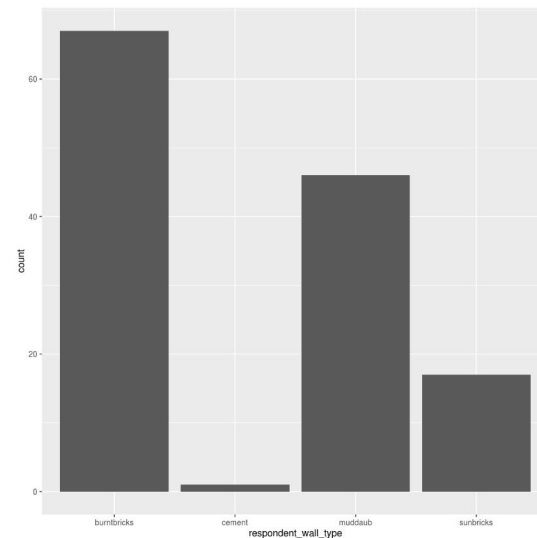
Schedule

	Setup	Download files required for the lesson
00:00	1. Before we Start	How to find your way around RStudio? How to interact with R? How to manage your environment? How to install packages?
00:40	2. Introduction to R	What data types are available in R? What is an object? How can values be initially assigned to variables of different types? What arithmetic and logical operators can be used? How can subsets be extracted from vectors and data frames? How does R treat missing values? How can we deal with missing values in R?
02:00	3. Starting with Data	What is a <code>data.frame</code> ? How can I read a complete csv file into R? How can I get basic summary information about my dataset?

Barplots

Barplots are also useful for visualizing categorical data. By default, `geom_bar()` accepts a variable for `x`, and plots the number of instances each variable appears in the dataset.

```
ggplot(data = interviews_plotting, aes(x = respondent_wall_type)) +  
  geom_bar()
```



We can use the `fill` aesthetic for the `geom_bar()` geom to color bars by the portion of each count that is from each village.

Data Privacy Project



Library Risk Assessment Profiles

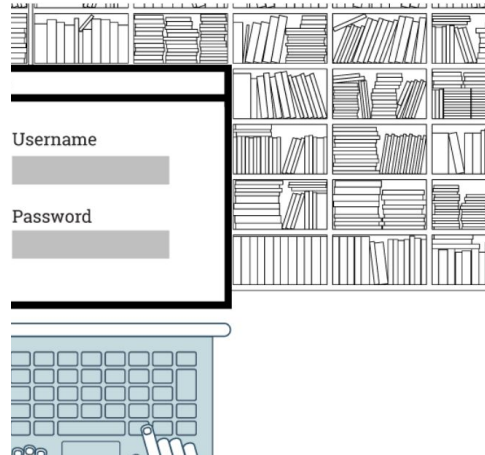
DATA
PRIVACY
PROJECT
dataprivacyproject.org

Patron 1, 20s: has smartphone and uses it for calls, text apps and occasionally for surfing the web. They use desktop computers at the library to apply for jobs and to shop online and to use Facebook.

Patron 2, an older adult: their only internet access is on library terminals, and they set up their first email account on a library terminal. They attend library classes for older adults on digital literacy.

Patron 3, 30s: they are a freelance journalist who frequently brings their laptop to the library and uses the public wifi. They conduct skype interviews with sources in public places, use facebook and twitter to communicate with sources and to promote stories

True or false: When you use a library terminal, the library knows what sites you have visited.



Step 1. Library user logs on.

A web user logs in at the library home screen.

She enters her patron ID and password onto the screen. Once the library's Integrated Library System validates her log-in credentials, she can use the computer to access the web.

TERMS

Integrated Library System: a relational database with patron-facing and staff-facing interfaces that allows the library to manage acquisitions, cataloging, circulation and reserves, serials holdings, and the online public access catalog.

log-in credentials: a username and password created by the user



Shoutout

Fontichiaro, K., Lennex, A., Hoff, T., Hovinga, K., & Oehrli, J. A. (Eds.). (2017). **Data Literacy in the Real World: Conversations & Case Studies.** <https://doi.org/10.3998/mpub.9970368>

Contains gems like:

- “But it's a number, so it has to be true!': An introduction to data literacy”
- “Real world data fluency: How to use raw data”
- “Data literacy and voting”
- “Using Social Explorer to help students gain insight”



Thanks!

Any questions?

You can find us at:

Jo Klein | @elk2klein & eiklein@uncg.edu

Megan Carlton | megancarlton@uncg.edu



References

- Bounegru, L., Chambers, L., & Gray, J. (Eds.). (2012). The Data Journal Handbook. Retrieved from <https://datajournalism.com/read/handbook/one/>
- Calzada Prado, J., & Marzal, M. Á. (2013). Incorporating Data Literacy into Information Literacy Programs: Core Competencies and Contents. Libri, 63(2). <https://doi.org/10.1515/libri-2013-0010>
- Carlson, J., Fosmire, M., Miller, 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. doi:10.1353/pla.2011.0022.
- Carlson, J., Nelson, M. S., Johnston, L. R., & Koshoffer, A. (2015). Developing Data Literacy Programs: Working with Faculty, Graduate Students and Undergraduates. Bulletin of the Association for Information Science and Technology, 41(6), 14-17. <https://doi.org/10.1002/bult.2015.1720410608>
- Glusker, A. (2017, September 26). Data Literacy: "What It Is and Why You Should Care." Retrieved October 16, 2019, from Dragonfly website: <https://news.nnlm.gov/pnr/data-literacy-what-it-is-and-why-you-should-care/>
- Shorish, Y. (2017, May 8). Data Information Literacy and Application | EDUCAUSE. Retrieved October 16, 2019, from Educause.edu website: <https://er.educause.edu/articles/2017/5/data-information-literacy-and-application>
- Urban Libraries Council. (2018). Leadership Brief: Libraries Leading Civic Engagement. Retrieved from https://www.urbanlibraries.org/assets/ULC_Leadership_Brief_Libraries_Leading_Civic_Engagement.pdf

end

**[Exit, pursued by a
librarian]**