# Big Sky Standards

## Real World Data Webinar Series

## Take the Intimidation Out of Data Through Mathematics

MONTANA OFFICE OF PUBLIC INSTRUCTION
THE GREAT SEAL OF THE STATE OF MONTANA
ORO Y PLATA

DataScience4

# MEET YOUR HOSTS

Samantha Leav
DIRECTOR OF POLICY

DataScience4 everyone

Lee Ellen Harmer
PARTNERSHIPS MANAGER

DataScience4 everyone

Katrina Engeldrum
MATH INSTRUCTIONAL COORDINATOR

Aimee Konzen
PROFESSIONAL LEARNING MANAGER

# MEET TODAY'S GUESTS

Mahmoud Harding
Instructional Design Director

DataScience4 everyone

Hannah Kurzweil
Community Manager

DataScience4 everyone

# MEET TODAY'S GUEST

**Kristina Dance**
Director of Data Science

kdance@stanford.edu

youcubed
at Stanford University

Inspiring Mathematics and Data Science Success for all Students through Growth Mindsets and Innovative Teaching

Our main goal is to inspire, educate and empower teachers of mathematics and data science, transforming the latest research into accessible and practical forms.

# Data Science Isn't Foreign - It's Familiar

**The Encouraging Truth:**

Data science builds directly on skills you're **already fostering**

- Asking good questions
- Thinking critically about information
- Communicating clearly

**This isn't a complete overhaul—it's an intentional step change**

**You're Building the Foundation When You...**

- Help students **support arguments with evidence** in writing
- Create **presentations** about research projects
- Discuss why **graphs need titles and labels**
- Guide students to explain **"why should anyone care?"**
- Teach students to **consider their audience**

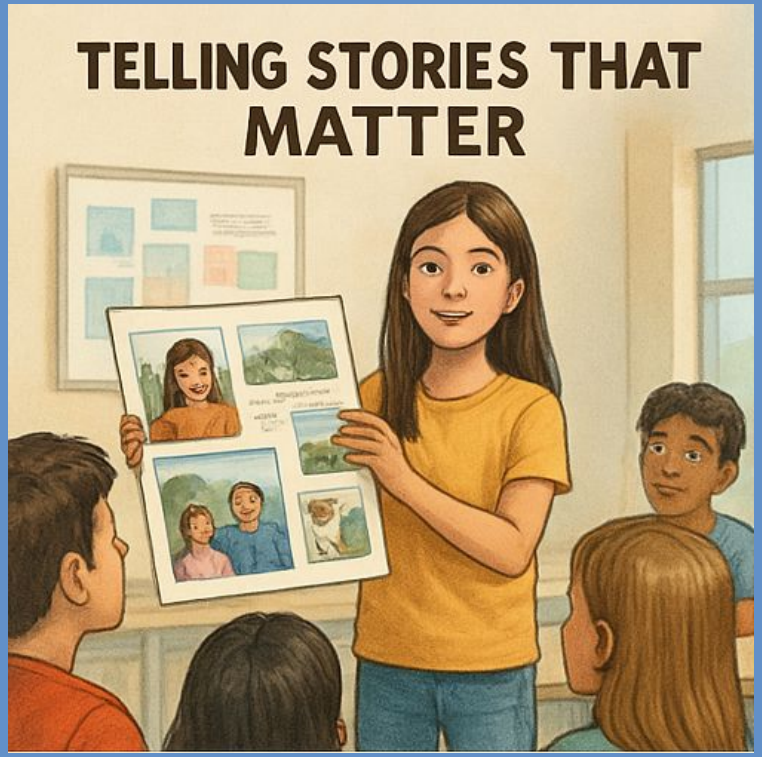

Image is AI generated

# Telling Stories That Matter

**What it means:**

Using data to communicate clearly and persuasively while being honest about evidence

**The data science step:**

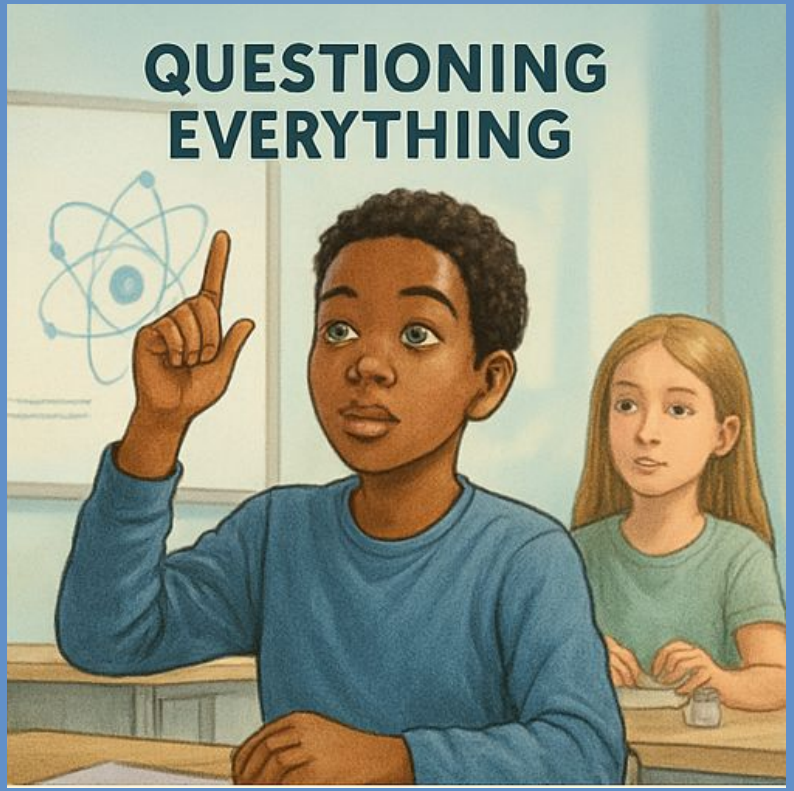


# Questioning Everything

**What it means:**

Developing healthy skepticism about data claims and spotting when analyses mislead

**You're already building this when you:**



# Making it Real

**What it means:**

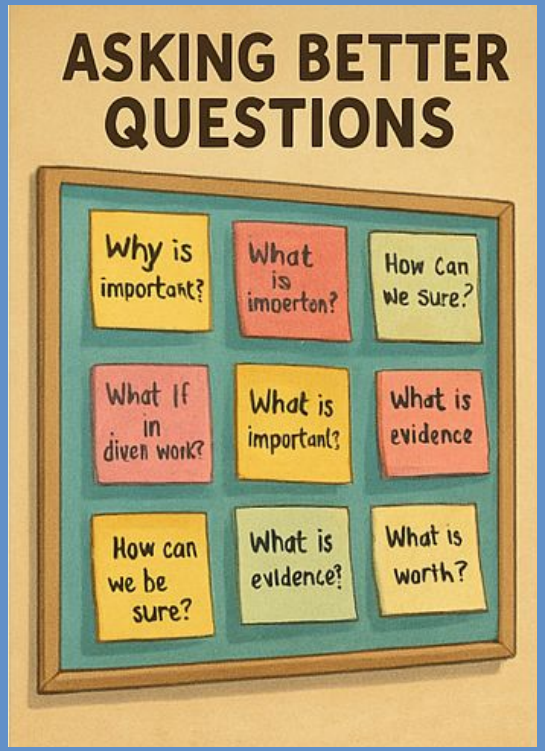
Connecting data skills to daily life and understanding ethical implications

# Asking Better Questions

**What it means:**

Moving from *"I wonder..."* to *"I wonder, and here's how we could find out with evidence..."*

**You're already building this when you:**

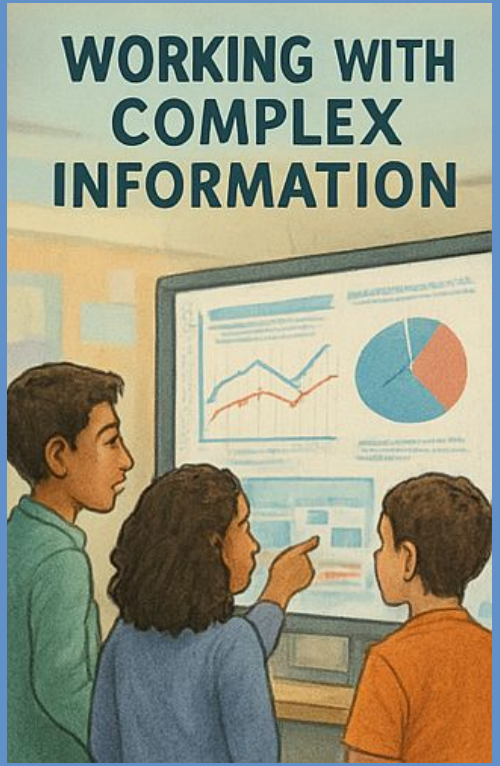


# Working with Complex Information

**What it means:**

Understanding that real-world data is messy and requires iterative exploration

**You're already building this when you:**



# Our North Star

**By graduation, students should be able to:**

- Investigate
- Create narratives
- Question claims and identify bias
- Make ethical decisions
- Communicate

# Learning Progressions

A. Dispositions & Responsibility

B. Creation & Curation

C. Analysis & Modeling

D. Interpreting Problems & Results

E. Visualization & Communication

# Progressions at a Glance

# How the Complexity Grows … *Naturally*

# Data Science Enhances Mathematical Thinking

- Statistics
- Graphing
- Proportional Reasoning
- Algebraic Thinking
- Problem Solving

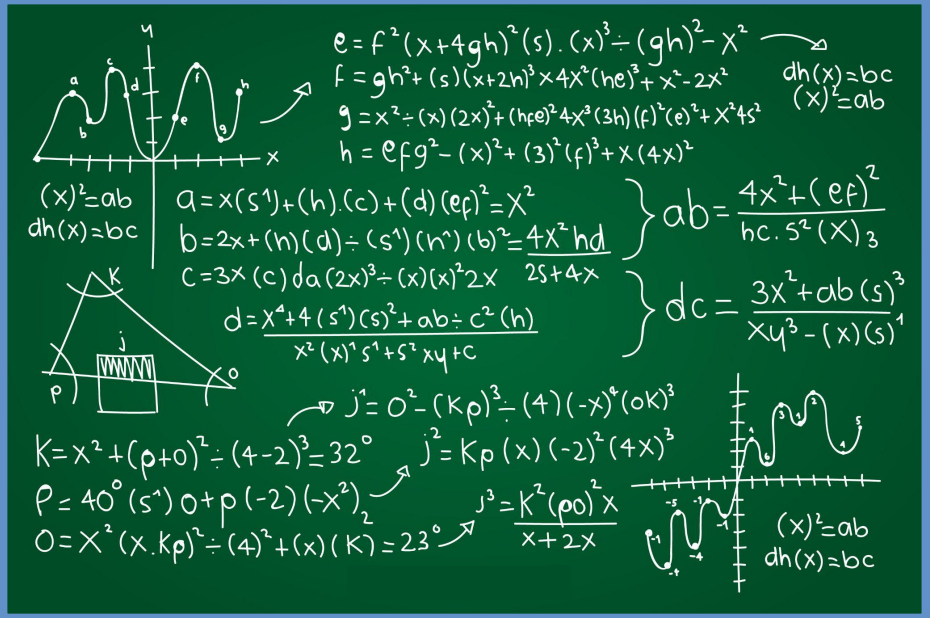


Image designed by Fereepik

*Data science makes mathematics more relevant and engaging*

# We’re Here to Help

**K-2: Data storytelling with class surveys**

*"Tell the story of our graph to a partner"*

**3-5: Questioning data and identifying surprises**

*"What's one thing that surprises you?*

*“What are three possible explanations?”*

**6-8: Working with messy data and community issues**

*"How could this information help people in our community?"*

**9-12: Independent investigations with ethical considerations**

*"Whose lives could be affected by decisions made with this data?"*

# Breakout Rooms

## Small Group Discussions by Grade Band

**Elementary Room:** Foundation-building activities and concrete experiences

**Middle School Room:** Connecting concepts and increasing complexity

**High School Room:** Sophisticated analysis and real-world applications


**GOAL:** Leave with **one concrete thing** you can try this week

# K-5 Slides and discussion

Kristina Dance, Youcubed

# Montana Data Science
# September 9, 2025

youcubed
K-12 Data Science

Kristina Dance. Director of Data Science Education
kdance@stanford.edu

youcubed
K-12 Data Science

# Data Talks

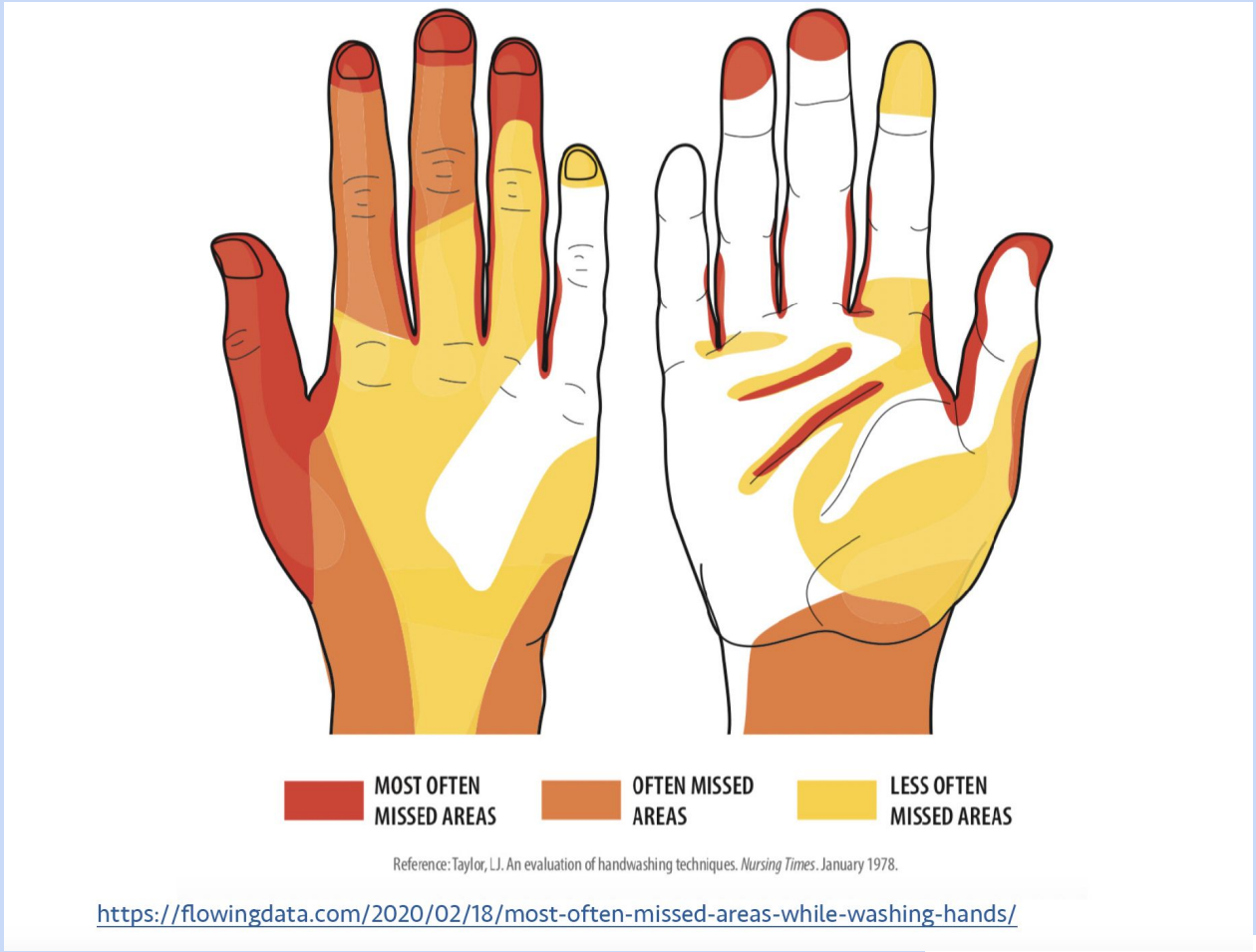
What do you notice? What do you wonder?
What story does the graph tell?



Youcubed Data Talk Basketball Stat

# What do you notice?

# What do you wonder?




https://flowingdata.com/2020/02/18/most-often-missed-areas-while-washing-hands/

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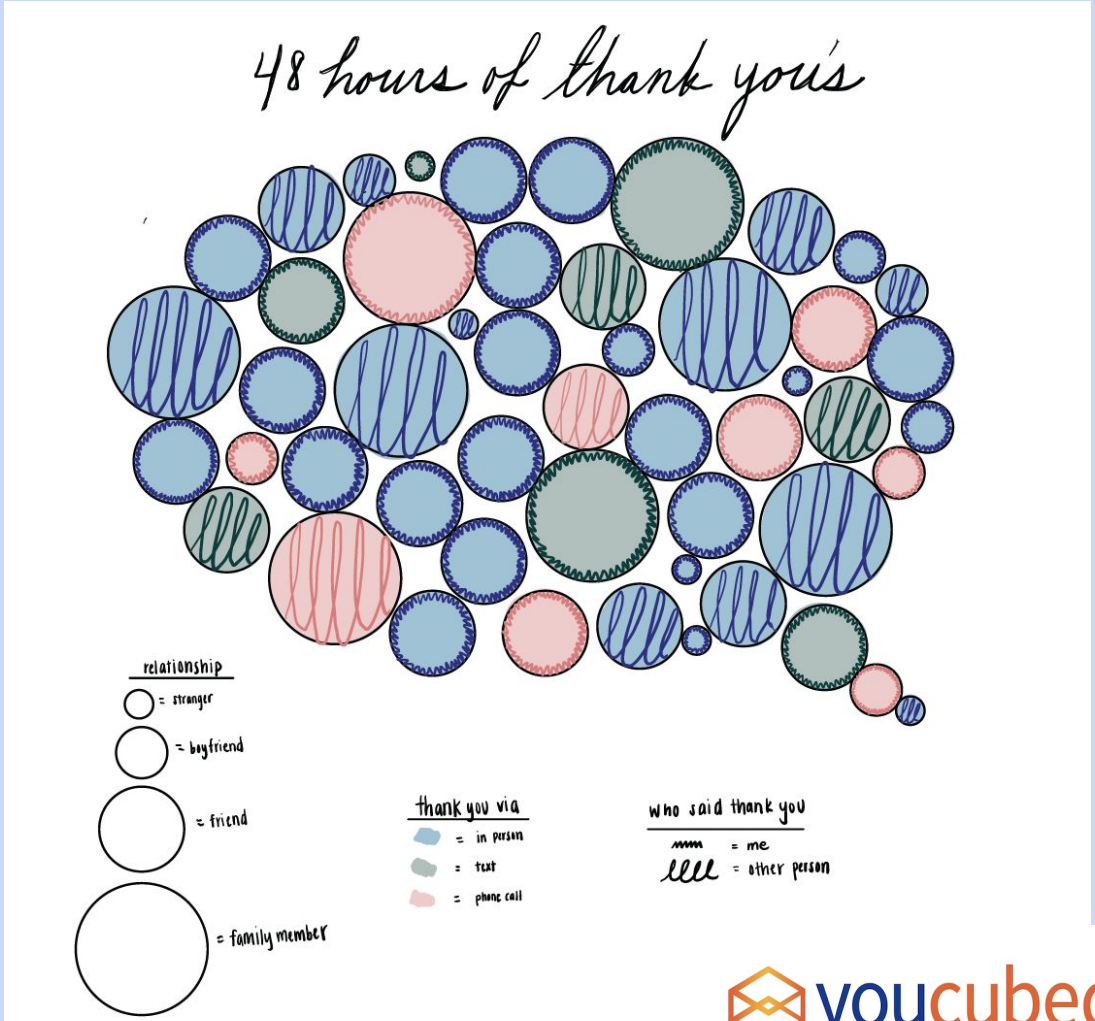
# What do you notice?

# What do you wonder?

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# Data Talk Outcomes

- Learn to read data visuals
- Invite creative thinking about data visuals
- Learn about a variety of contexts- interdisciplinary
- Assess formatively
- Inviting and inclusive pedagogy
- Introduce new content

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# Data Science Process

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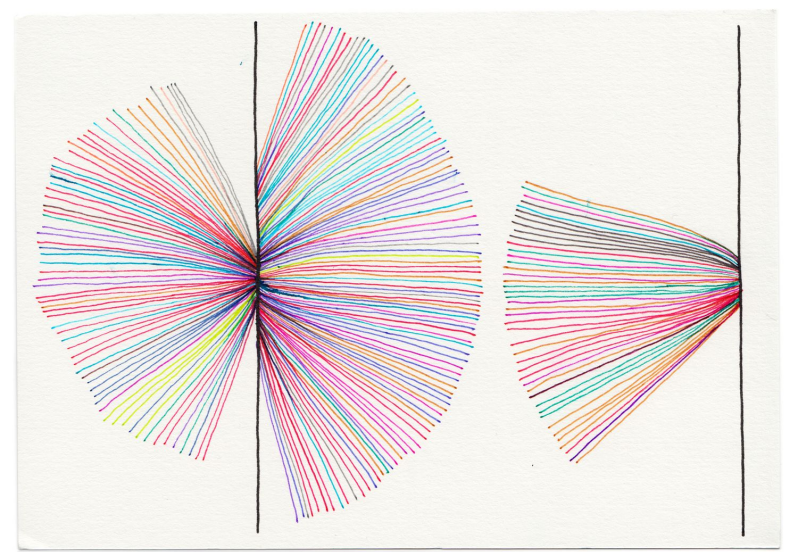
Formulate statistical investigative questions

Collect/ consider the data

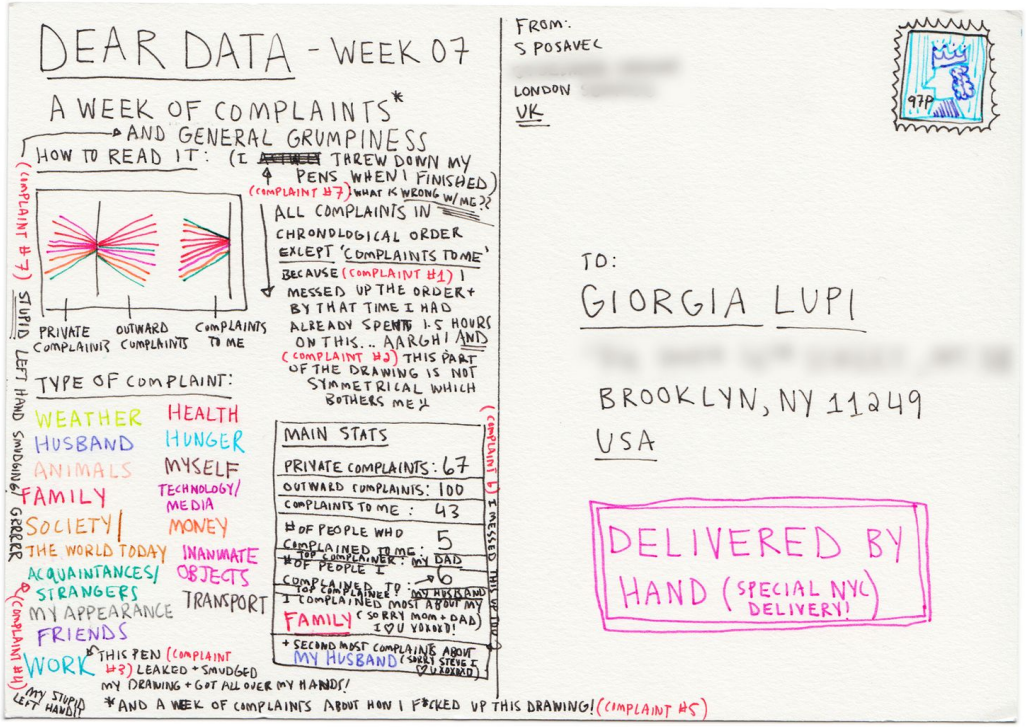
Model and analyze

Interpret and communicate

# Dear Data Project



Collecting data on complaints



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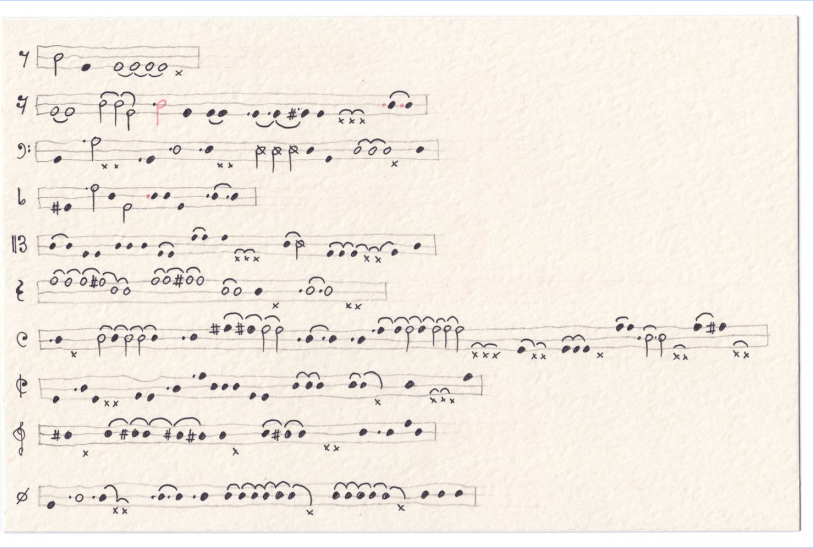
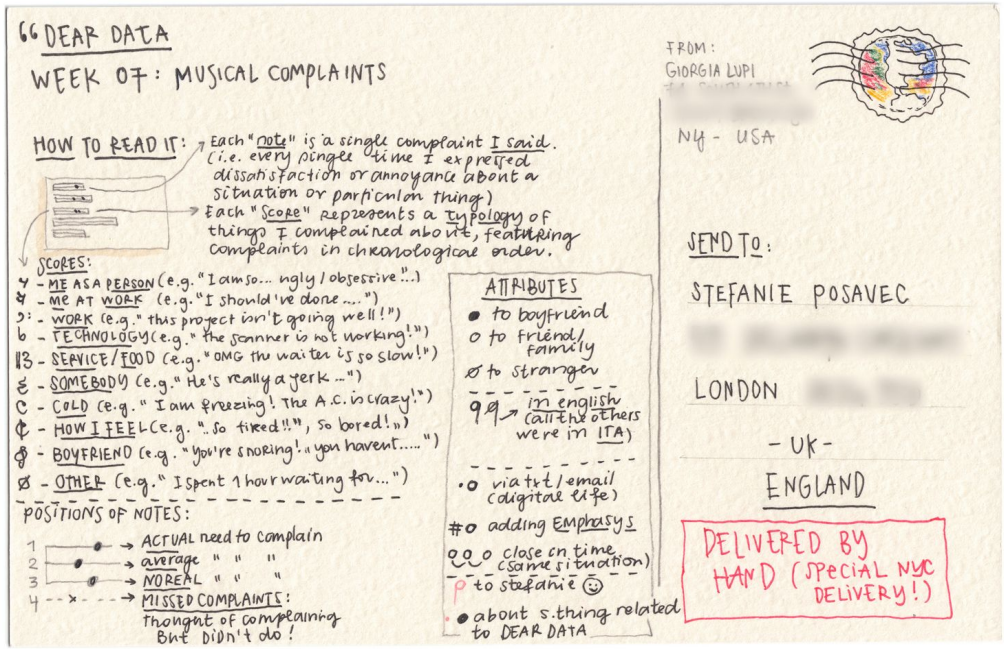


Collecting data on complaints



# Data Science Process

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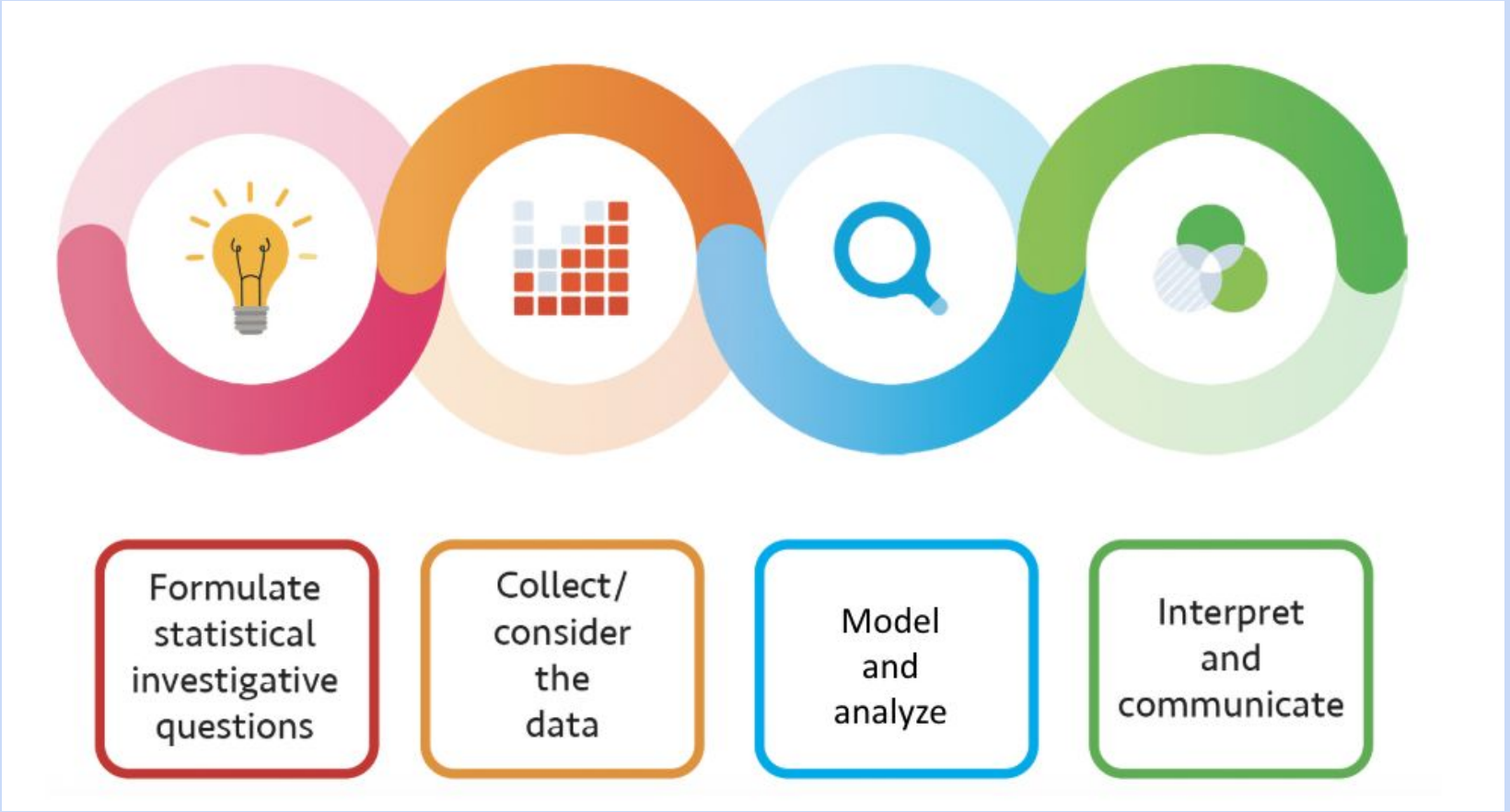

# Dear Data Examples

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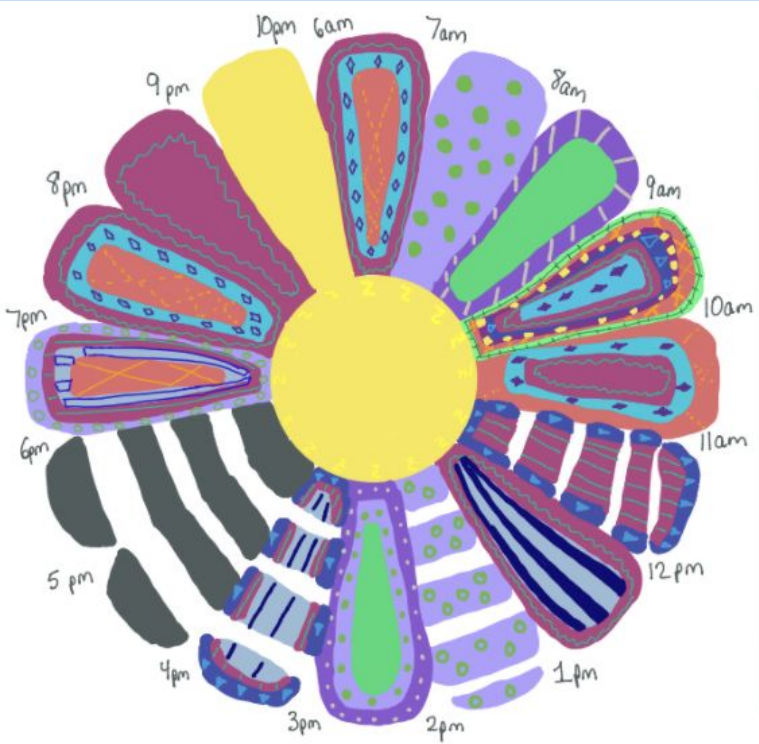
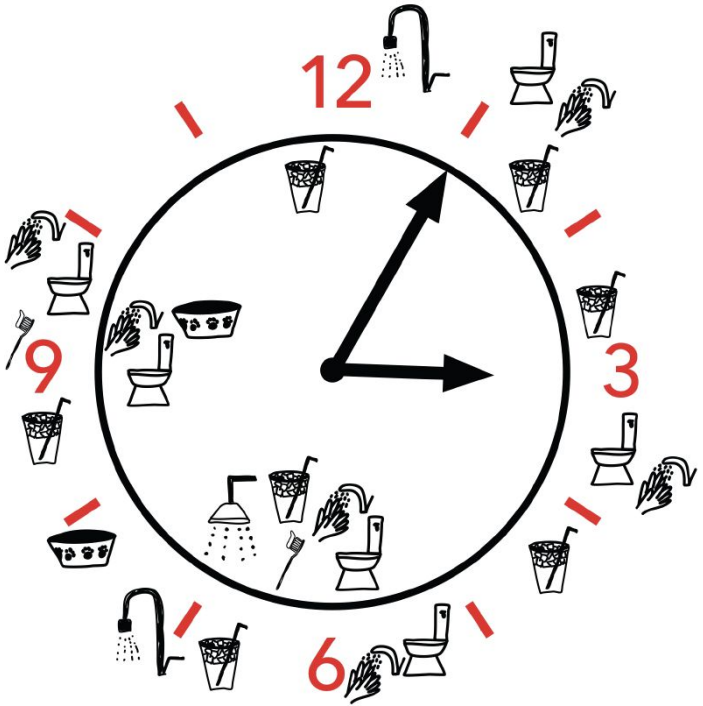


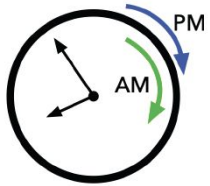

| My Actions | # of Occurances | Daisy's Responses | # of Occurances |
|---|---|---|---|
| • Physical Pet<br>mm = belly rub ▮ = Pat | 7 | • Roll over<br>◊ = from sitting ◆ = from standing | 4 |
| • Show a treat<br>⁘ = cheese ▨ = cookie | 2 | • Walk away<br>▮ = I annoyed her ▯ = distraction | 4 |
| • Call name<br>○ = actual name (Course) ● = nickname (Daisy, Doodle, etc.) | 4 | • Come<br>Solid fill = when called | 2 |
| • Talk to Daisy<br>X = scolding ⁘ = positive | 6 | • Paw (beg)<br>▲ = unprompted △ = Prompted | 3 |
| • No interaction | 2 | • Sleep<br>Z = herbed Ƶ = other | 16 |
| • Give Daisy a shower<br>□ = Paws ■ = full | 1 | • Muddy<br># = digging = = rain | 1 |

Not in class = solid  While in class = dashed

Collecting data on interactions with dog and dog's reactions.

# How much water do I use over one day?




Drink water

Hand washing

Wash dishes

Pet water

Shower

Toilet flush

Brush teeth

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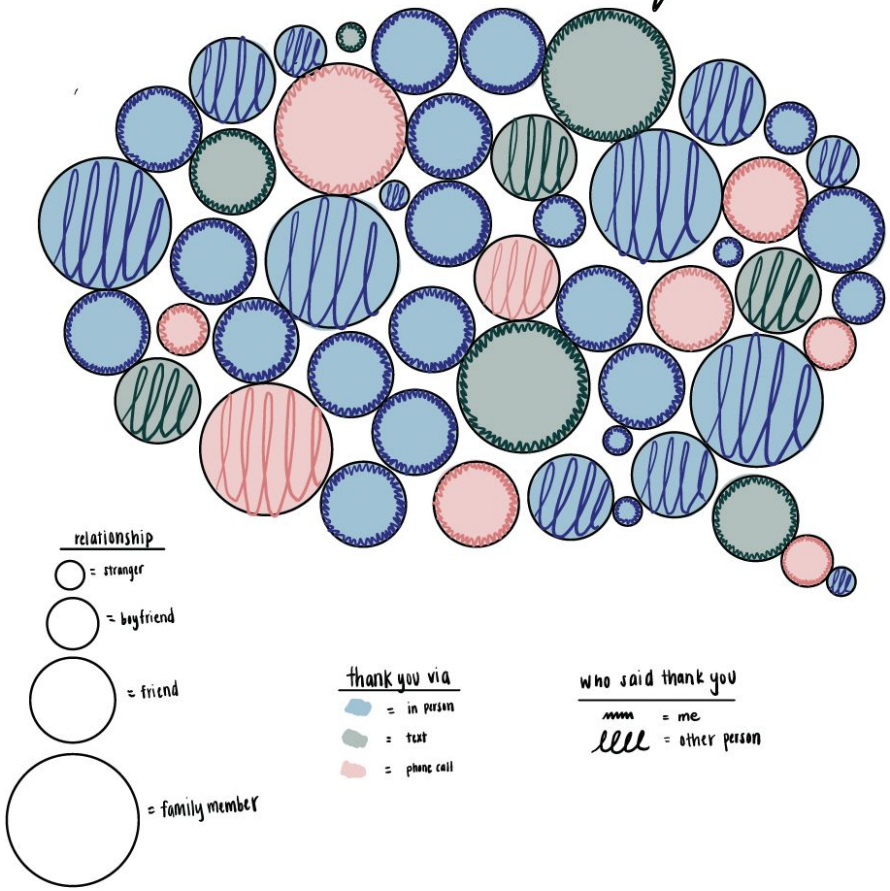
# 48 hours of thank you's

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From Fiona: My Spotify Consumption

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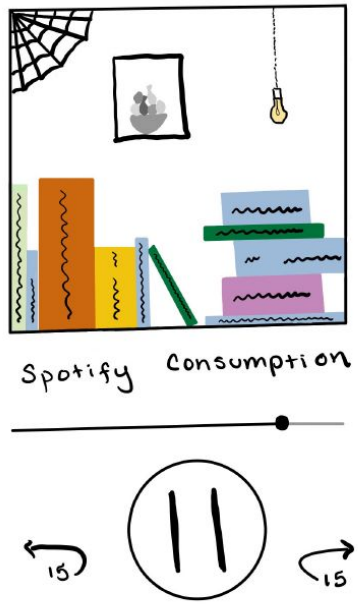


action while listening
- chores
- driving
- reading
- getting ready for bed
- eating
- working out

time of day while listening
- long stack: night
- tall stack: afternoon

what I listened to
- tall, skinny book: edm music
- short, skinny book: pop music
- tall, large book: rain sounds
- short, large book: podcast

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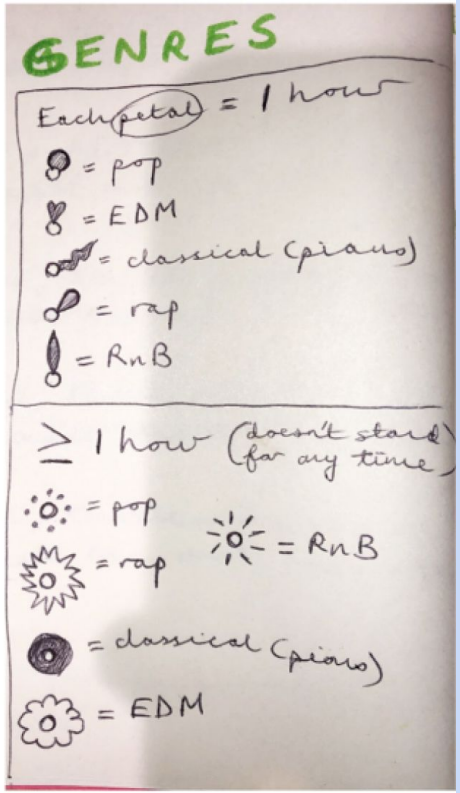


# What music did I listen to for a week?

What topics might you or your students be interested in exploring?

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# School-wide project

**Data Day**: In this project, students at Woodside school across the grades had a ‘data day’. Students at every grade level collected, analyzed, and presented data on where students feel the most safe. (Video)

What stands out to you from this video?

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# Q&A

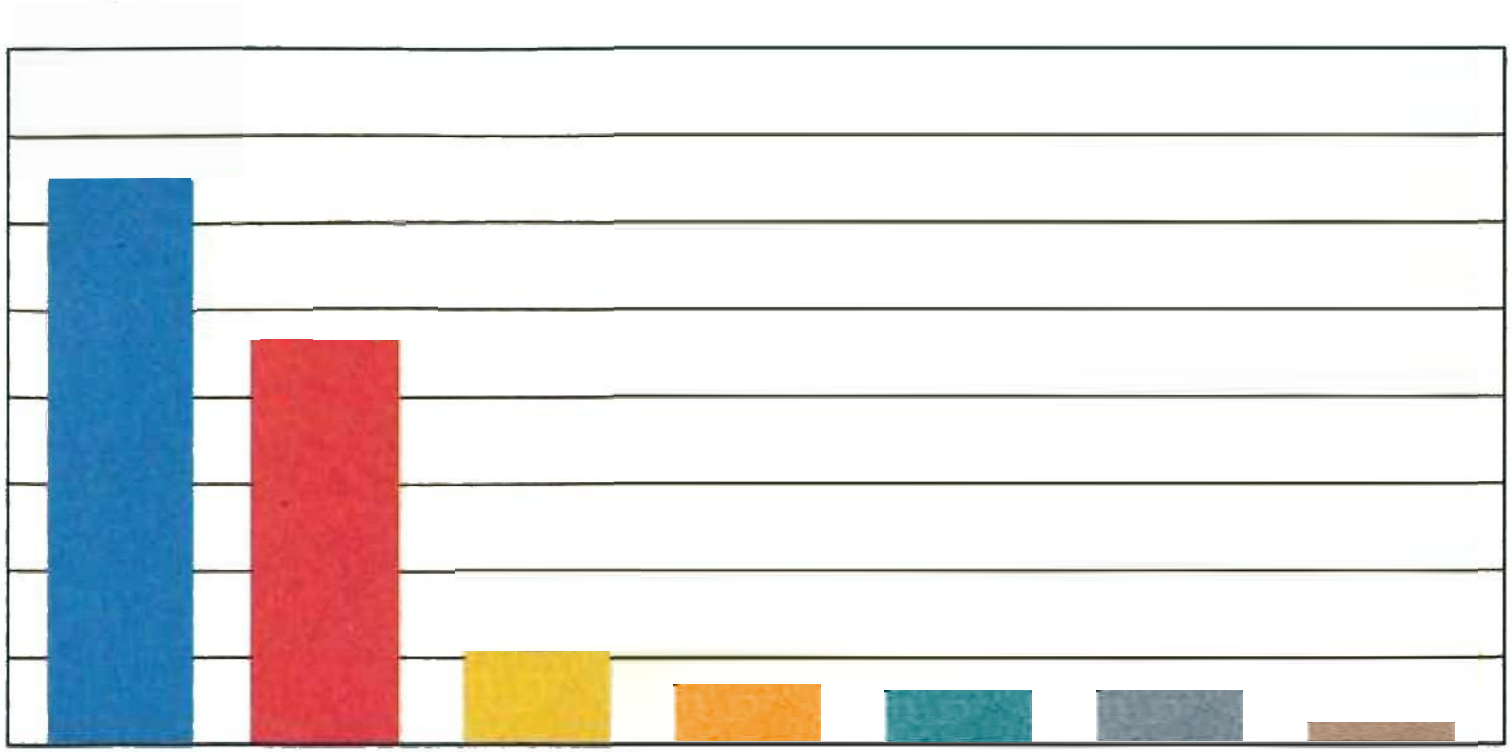
- Youcubed: Data Talks
- Youcubed K-10 Data Science Lessons
  - Dear Data Task
  - Data Day Task
- Youcubed 6-10 Unit
- Youcubed High School Data Science Course: https://hsdatascience.youcubed.org/
- To sign up for updates: https://www.youcubed.org/sign-up/
- datascience@youcubed.org

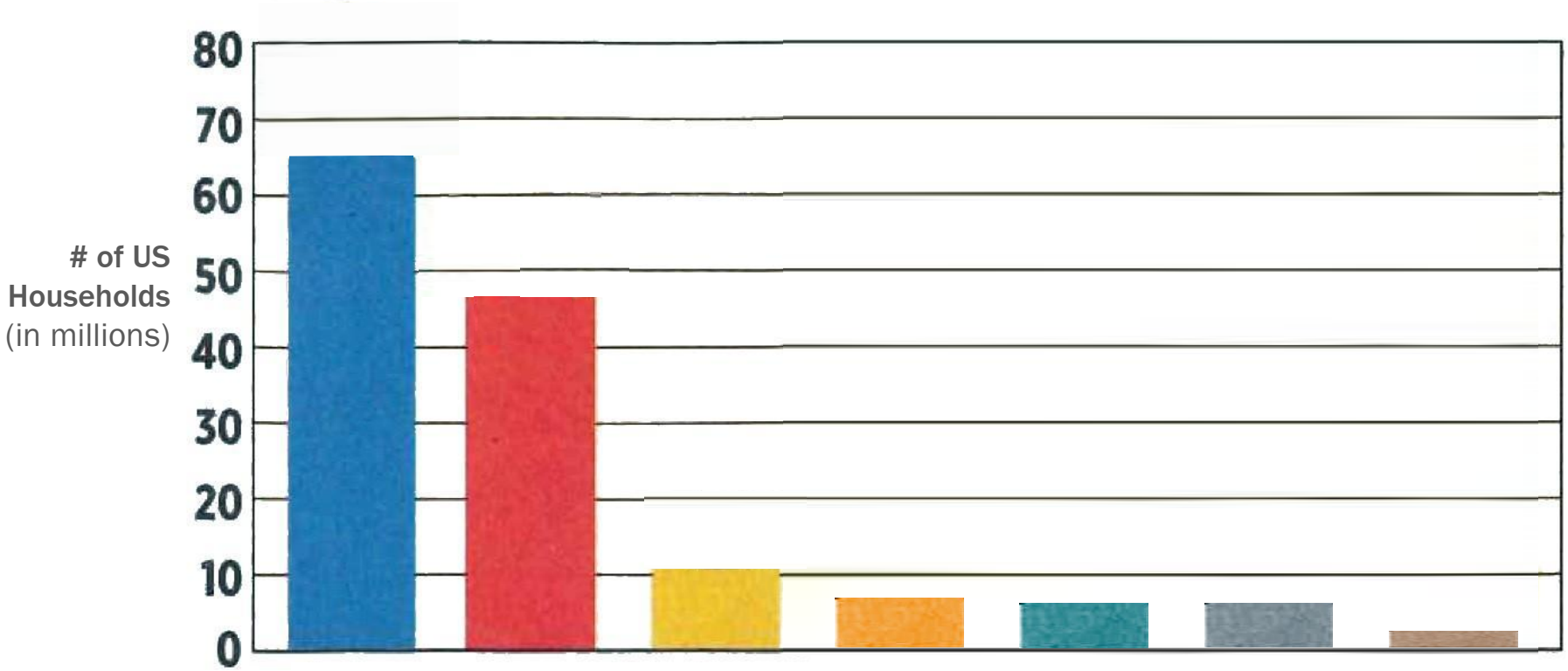
# 6-8 Slides and discussion

Hannah Kurzweil, DS4E

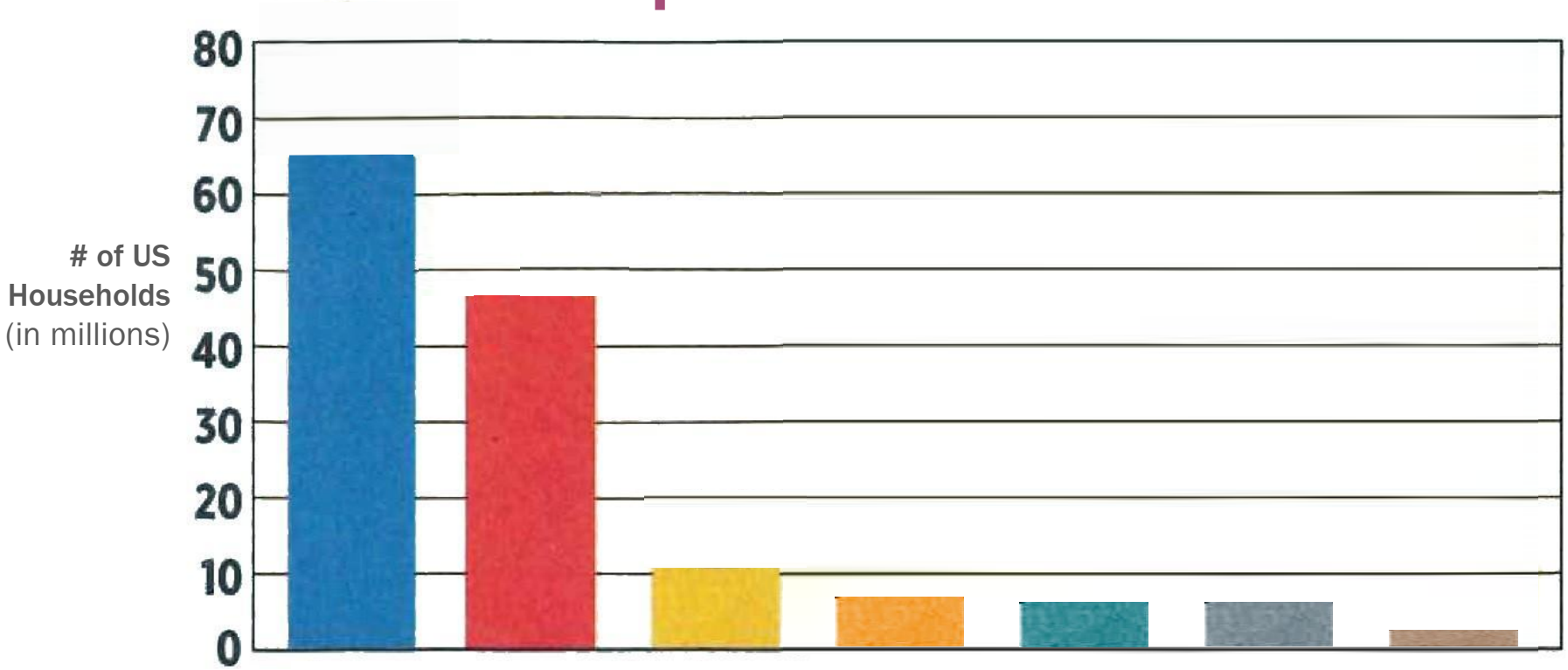
# Middle School Group - HK

# Slow Reveal Graphs

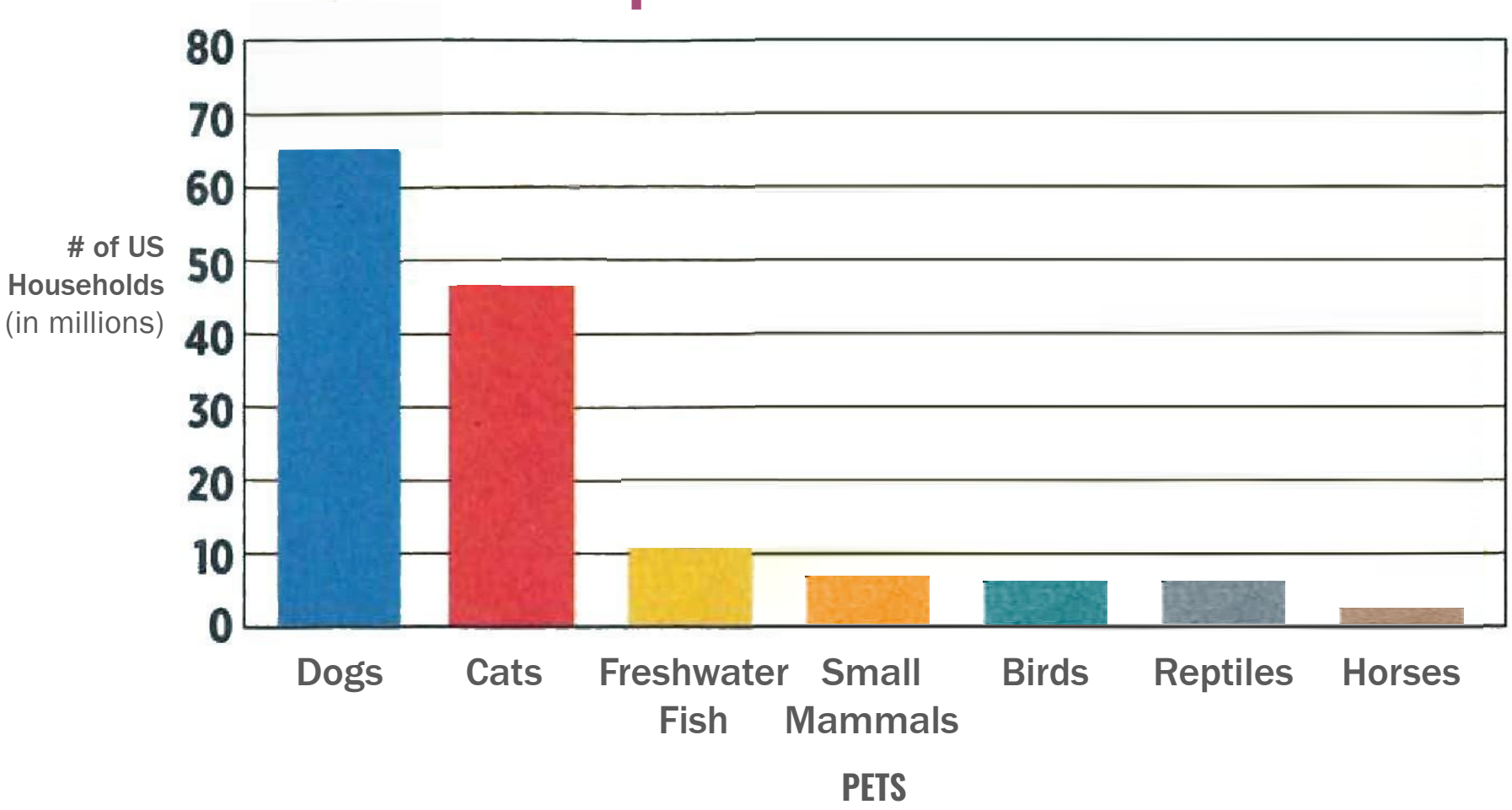



80
70
60
50
40
30
20
10
0
# of US Households
(in millions)

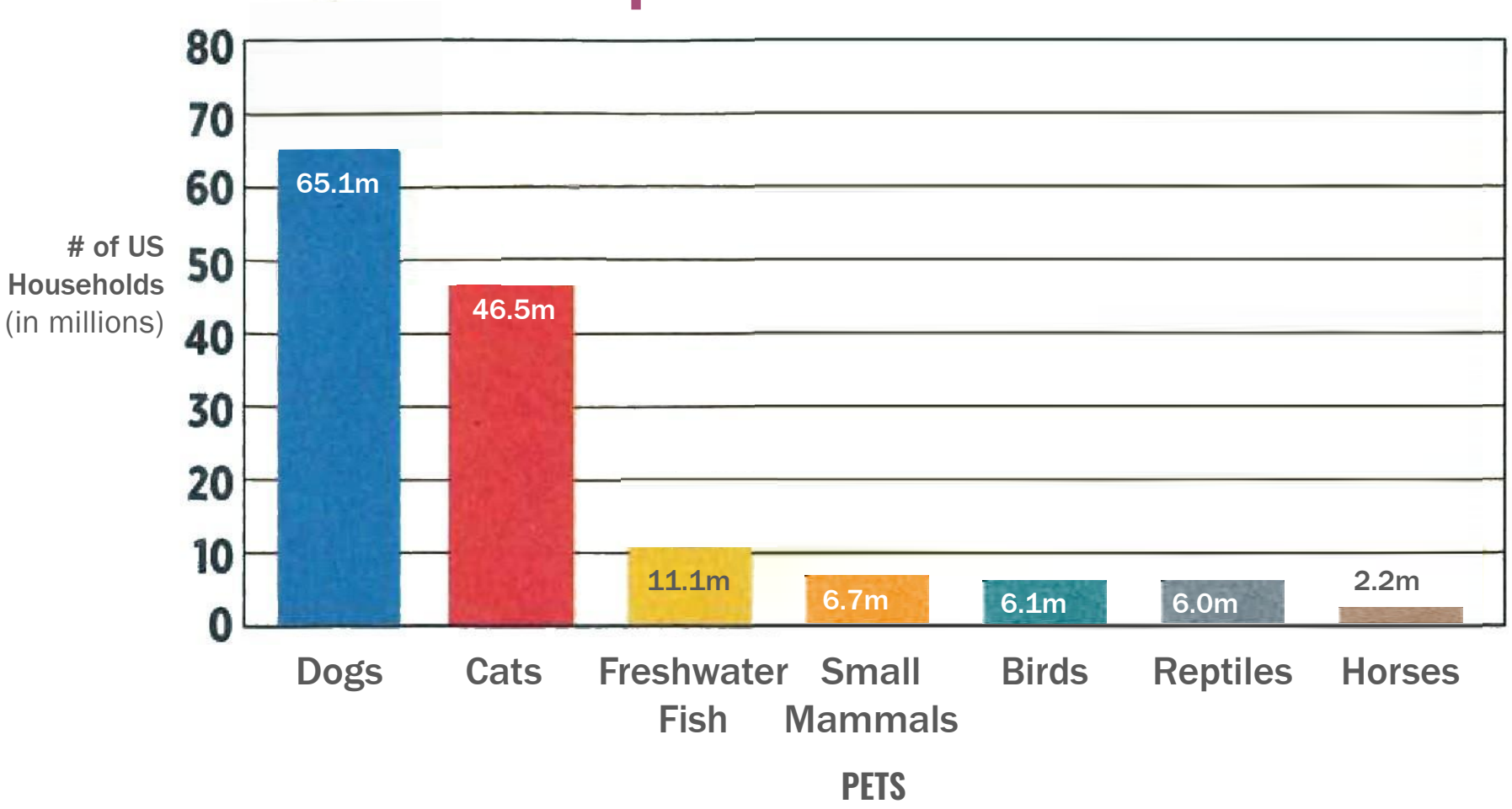
# Most Popular Pets in the US



# Most Popular Pets in the US



# Most Popular Pets in the US



# Charty Party

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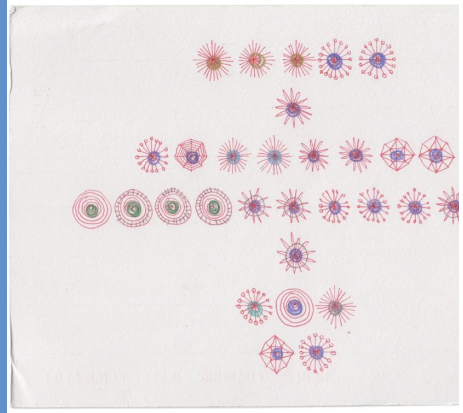

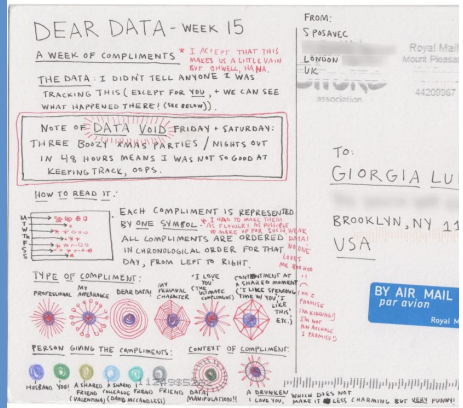


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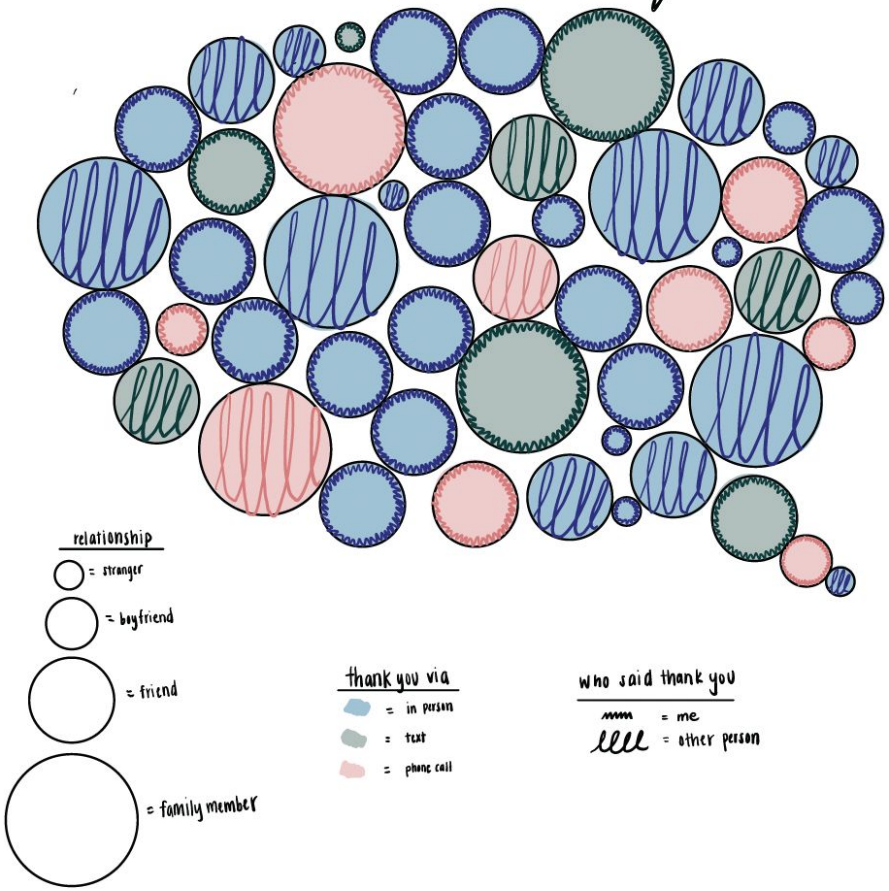
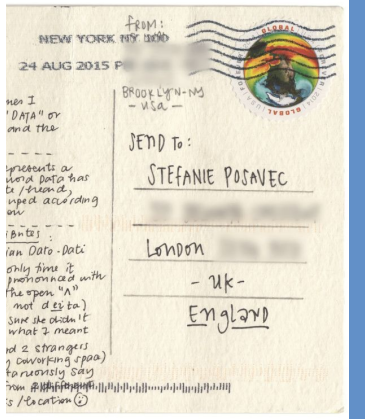
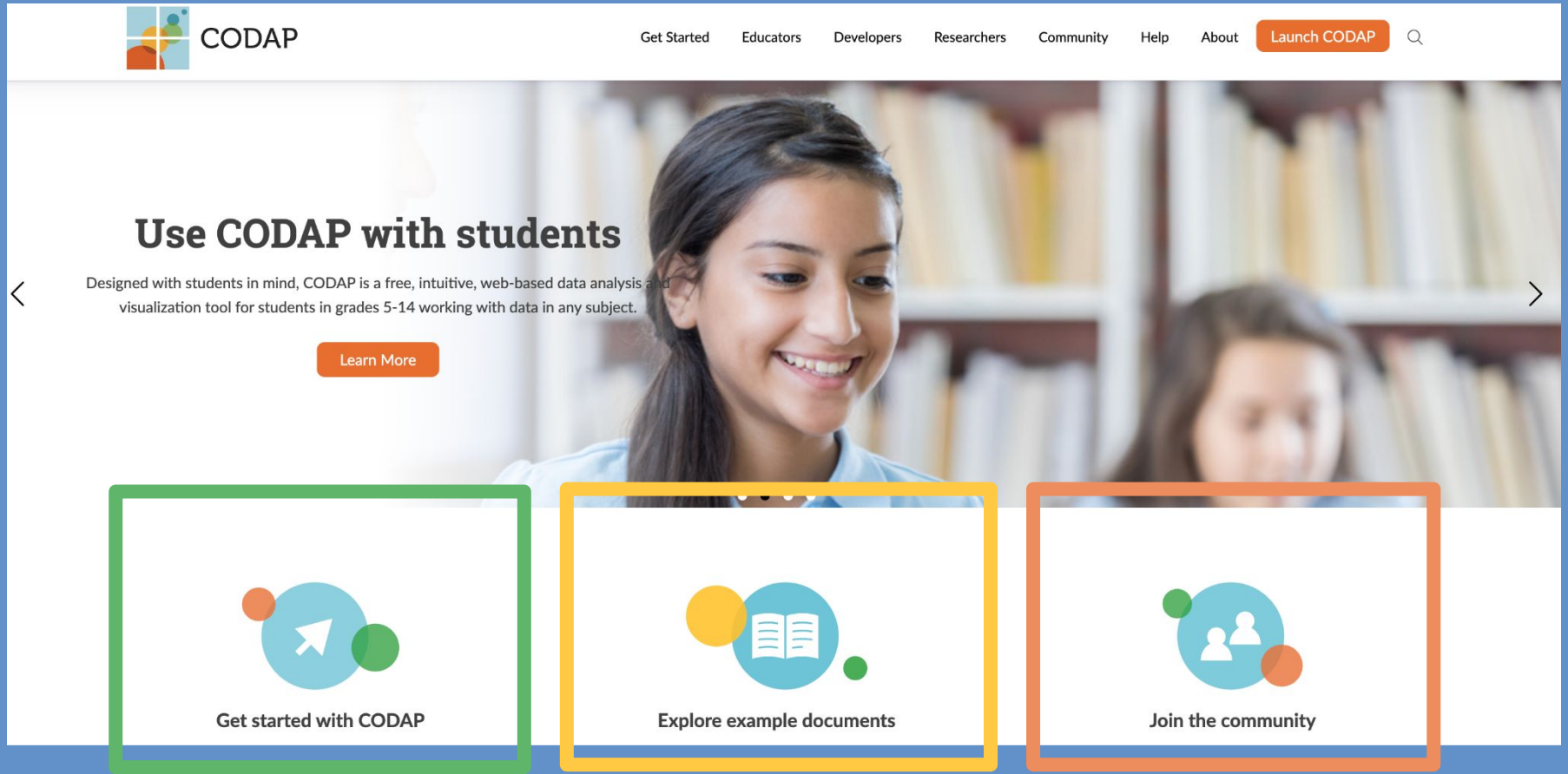


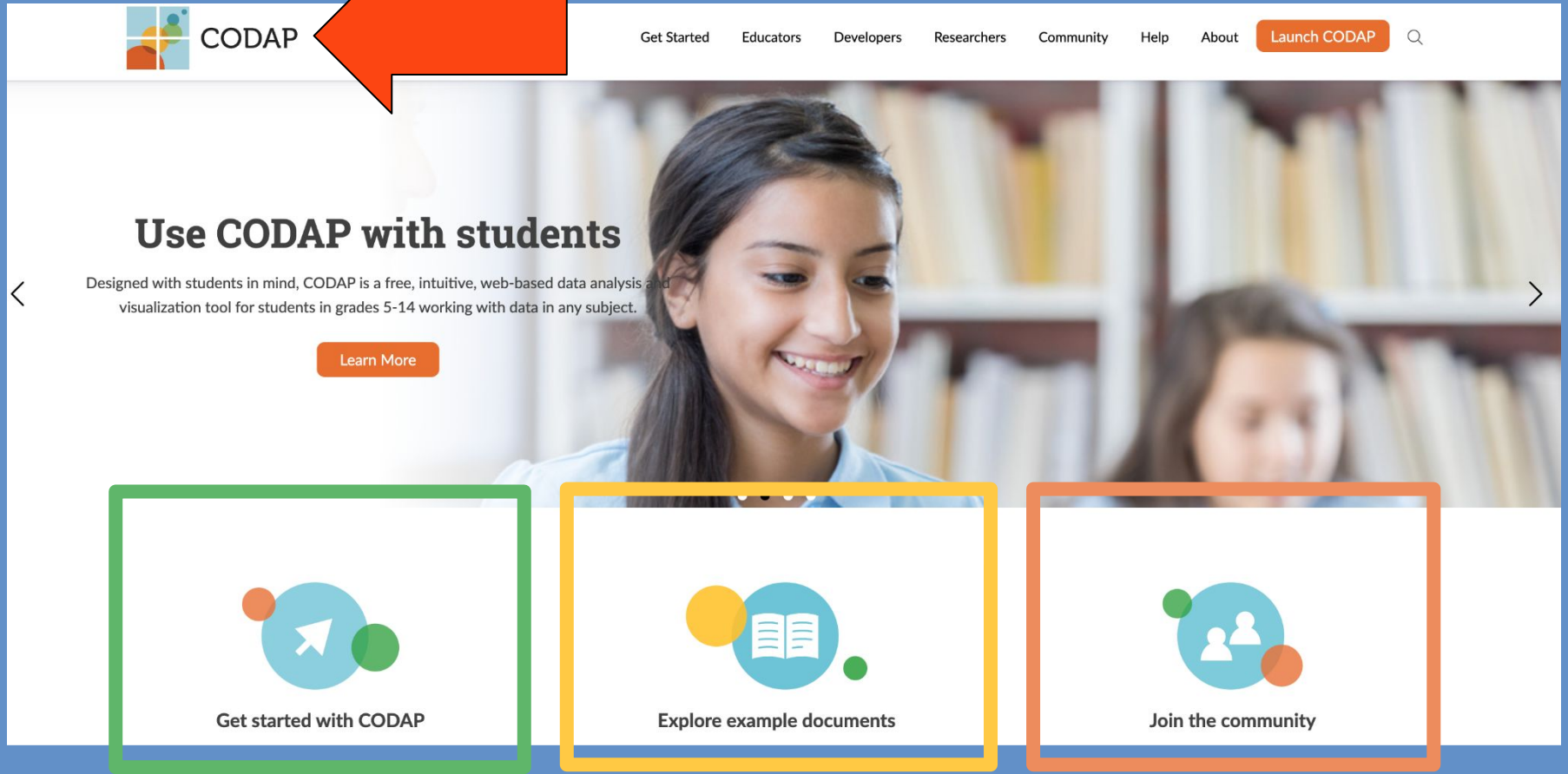
# Common Online Data Analysis Platform



# 9-12 Slides and discussion

Mahmoud Harding, DS4E

# Common Online Data Analysis Platform



# Let’s Explore CODAP

# Share Out

Breakout Groups Share Their Takeaways


JOIN US NEXT TIME
October 14th
“Assessing Data Skills + Analyzing Assessment Results”
Sign up here

# Questions and Answers

To access recordings and slides please visit the Montana OPI Math Page

https://shorturl.at/Awnp2

Contact us at OPICSI@mt.gov

# Feedback and Evaluation

Please complete the feedback form to request a Professional Development Unit Certificate from OPI and to provide feedback for improvement.