

Building Thinking Classrooms Using Data Science Concepts: A Collaborative Approach to K–12 Education

June 30, 2026
8:00 am - 10:10am

Presented by:

Andy Boyd, NCESD

Cari Haug, NCESD



Meet Your Facilitators!



Andy Boyd
NCESD Regional Math Coordinator

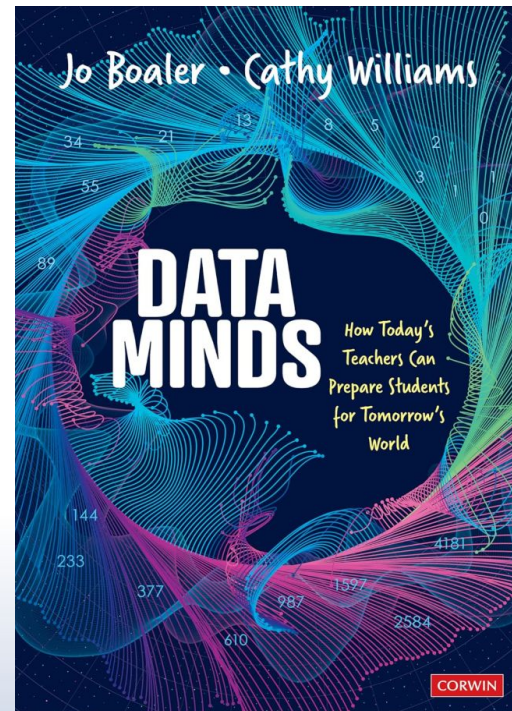
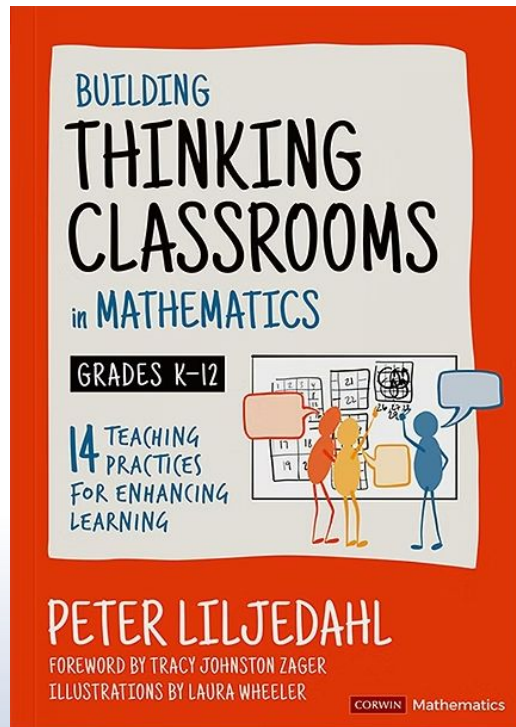


Cari Haug
NCESD Regional Science Coordinator



Thank you to Peter and Jo!

Much of what we share today comes from our learning through Dr. Liljedahl's and Dr. Boaler's work which can be found in these two texts as well as others authored by them.



Engaging in Data Science Together

What's Your Favorite Season?			
 Winter		 Spring	
January	February	April	May
		June	
December		September	
Fall		 Summer	
November	October	August	July



What's Your Favorite Season and Why?

Find a partner.

Take turns sharing with your partner your favorite season and why it is your favorite.

Each of you place a **blue dot** on the poster indicating your favorite season.

Each of you place a **red dot** on the season you celebrate your birthday.

What's Your Favorite Season?			
 Winter		 Spring	
January	February	April	May
March		June	
 Fall		 Summer	
December	November	September	August
	October		July



What do you notice? What do you wonder?

In your trio,

Capture noticings and wonderings around

- People's favorite seasons?
- When people celebrate their birthdays?

What's Your Favorite Season?			
 Winter		 Spring	
January	February	April	May
 Fall		 Summer	
December	November	August	July

Notice

Wonder



What is a Statistically Investigative Question?

A statistical investigative question:

- Can be answered with data
- Involves measurable and/or observable (yes/no variables)
- Anticipates variability (different results for different people or situations)
- Often compares groups or looks for relationships

A statistical question does not have one single fixed answer.



Write a SIQ for Our Seasons and Birthday Data

Back at your boards,

- Write a SIQ (or two...) for our community data

Notice	Wonder

Reflection Tool

- Take a moment to capture some ideas in your tool



Building Thinking Classrooms Framework 14 Practices

1. Give thinking tasks
2. Frequently form visibly random groups
3. Use vertical non-permanent surfaces
4. Defront the classroom
5. Answer only keep thinking questions
6. Give thinking task early, standing, and verbally
7. Give check-your-understanding questions
8. Mobilize knowledge
9. Asynchronously use hints and extensions to maintain flow
10. Consolidate from the bottom
11. Have students write meaningful notes
12. Evaluate what you value
13. Help students see where they are and where they are going
14. Grade based on data (not points)

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Washington Data Science Standards K - 12

Formulate statistical investigative questions.

Collect and consider data.

Analyze the data.

Interpret results.



GAISE II Problem Solving Cycle

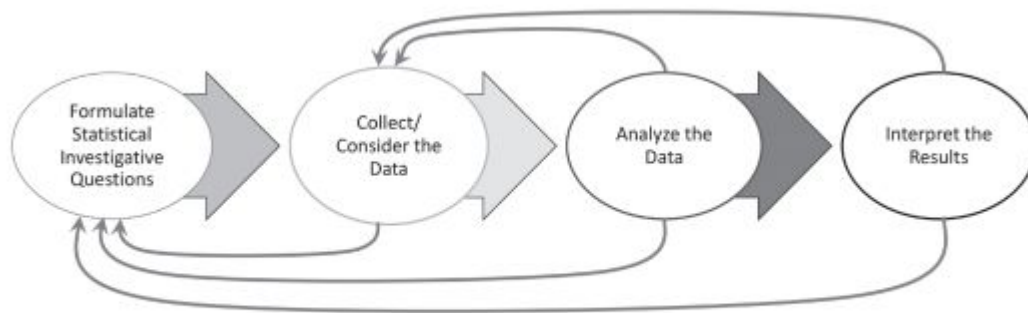


Figure 3: Statistical problem-solving process

The purpose of the statistical problem-solving process is to collect and analyze data to answer statistical investigative questions.

Data Science Review Task

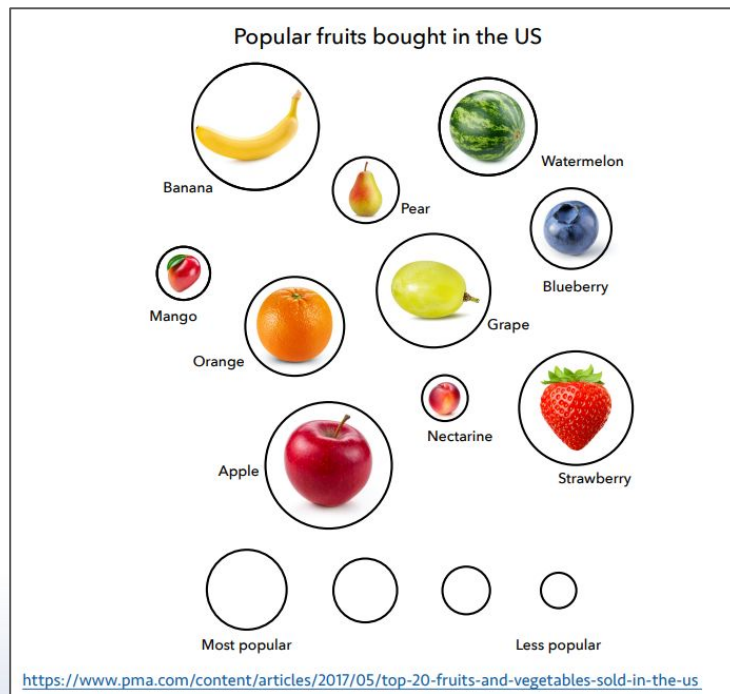
- New random groups
- Introduce yourself to your new team mates
- Empathy booster: When you return from summer break, will it be harder to return to wearing shoes or harder to return to wearing pants?
- Rotate through each station
 - There will be a 2 minute warning
 - Erase your response before moving to the next station
 - Do not rotate until told to do so



Pattern Seeking

With your trio,

- Say hello :)
- What patterns do you notice?
- What surprises you or stands out most in this data?

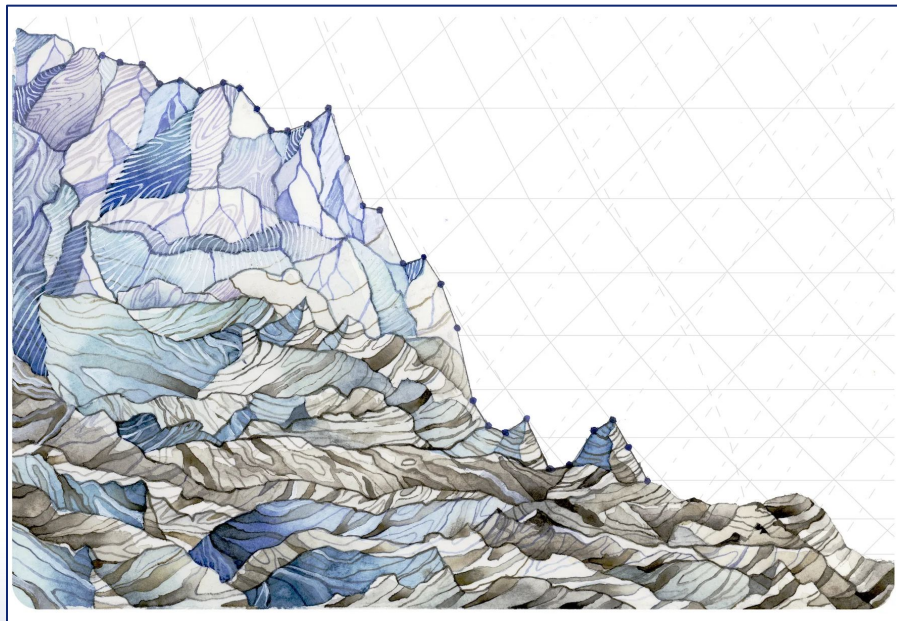


Data Visualization

Why might a data scientist represent data in this way? (a piece of art, not just a line graph)

Consider the various ways that you have encountered data, what drew you to examining the data closer?

What does this make you think about in creating your own data visualizations?



Data Visualization By [Jill Pelto](#)

Organizing Data

Examine the dataset and decide how you would structure the data for analysis.

Why is your organization helpful for analysis?

File Roller Coasters Unsaved CODAP v3.0.1 (2934)

Tables Graph Map Slider Calc Text Web Page Plugins

Sample of US Roller Coasters Across Years

States (1 case, 31 hidden)

	State	West Coast	newAttr2
1	California		

Roller Coasters (18 cases, 139 hidden)

	Coaster	Park	Top Speed (mph)	Max Height (ft)	Drop (ft)	Length (ft)	Duration (sec)	Type	Design	Year Opened	Age Group	Inversions	Num of ...rsions	City	newAttr
1	X	Six Flags...	76	175	215	3,610		Steel	4th Dim...	2002	newest	Y	2	Valencia	
2	Giant Dipper	Santa Cr...	55	70	65	2,640	112	Wooden	Sit Down	1924	older	N	0	Santa ...	
3	Colossus	Six Flags...	62	125	115	4,325	150	Wooden	Sit Down	1978	older	N	0	Valencia	
4	Demon	Paramo...	50	102	90	2,130	105	Steel	Sit Down	1976	older	Y	4	Santa ...	
5	Montezooma's ...	Knotts B...	55	148	137	800	36	Steel	Sit Down	1978	older	Y	1	Buena...	
6	Riddlers Revenge	Six Flags...	65	156	146	4,370	180	Steel	Stand Up	1998	recent	Y	6	Valencia	
7	GhostRider	Knotts B...	56	118	108	4,533	160	Wooden	Sit Down	1998	recent	N	0	Buena...	
8	Viper	Six Flags...	70	188	171	3,830	150	Steel	Sit Down	1990	recent	Y	7	Valencia	
9	Jaguar!	Knotts B...	35	65	45	2,602	120	Steel	Sit Down	1995	recent	N	0	Buena...	
10	Screamer	Scandia ...	50	90	80	2,600	116	Steel	Sit Down	1995	recent	N	0	Ontario	
11	Superman The ...	Six Flags...	100	415	328	1,235	28	Steel	Sit Down	1997	recent	N	0	Valencia	
12	Top Gun	Paramo...	50	102	91	2,260	146	Steel	Inverted	1993	recent	Y	3	Santa ...	
13	Invertigo	Paramo...	50	161	138	1,014	90	Steel	Inverted	1998	recent	Y	3	Santa ...	
14	Goliath	Six Flags...	85	235	255	4,500	180	Steel	Sit Down	2000	newest	N	0	Valencia	
15	Medusa	Six Flags...	65	150	150	3,937	195	Steel	Sit Down	2000	newest	Y	7	Vallejo	
16	California Screa...	Disneys ...	55		108	6,072	156	Steel	Sit Down	2001	newest	Y	1	Anahe...	
17	Scream!	Six Flags...	63	150	141	3,985	180	Steel	Sit Down	2003	newest	Y	7	Valencia	
18	Zonga	Six Flags...	62	115	98	3,675		Steel	Sit Down	2003	newest	Y	4	Vallejo	

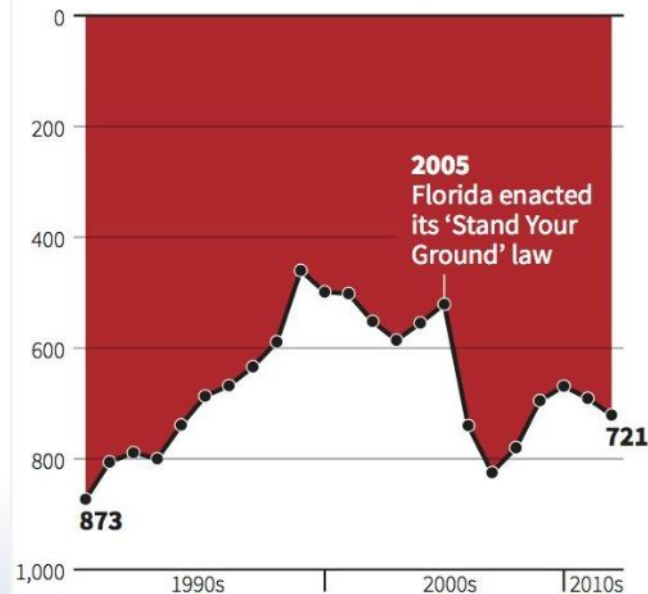
Be a skeptic

Ask the four skeptical questions:

- Who produced this data?
- Are the axes sensible?
- Is all the data displayed? What is missing? (What or who is not represented in the data?)
- Is the data showing a causal relationship, or is it just correlational?

Gun deaths in Florida

Number of murders committed using firearms



Source: Florida Department of Law Enforcement

C. Chan 16/02/2014

REUTERS



Reflection

- Take a moment to capture some ideas in your tool

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BREAK

5 minutes



North Central Educational Service District

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The Set Up for Task 3

Write a member of your trio's name

Record their movie theater or home theater

- **Share the pen**

Write a member of your trio's name

Record their movie theater or home theater

- **Share the pen**

Record their movie theater or home theater

Record their savory or sweet



Card Sort Activity

With your group:

- Examine and discuss the visualizations
- Sort images into three categories:
 - Mild
 - Medium
 - Spicy

Names ()	Mild Images	Medium Images	Spicy Images
Reasoning for grouping of images			

Reflection

- Take a moment to capture some ideas in your tool

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Q & A



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www.ncesd.org | [@ncesd171](https://twitter.com/ncesd171)

Resource Links - Bad Graphs

<https://flowingdata.com/category/visualization/ugly-visualization/>

<https://ticktockmaths.co.uk/badgraphs/>

<https://viz.wtf/>

<https://www.tylervigen.com/spurious-correlations>



Connect with us!

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Thank you

