



Session 3

Altering Perspectives: Using Data Visualization to Analyze Authentic Situations

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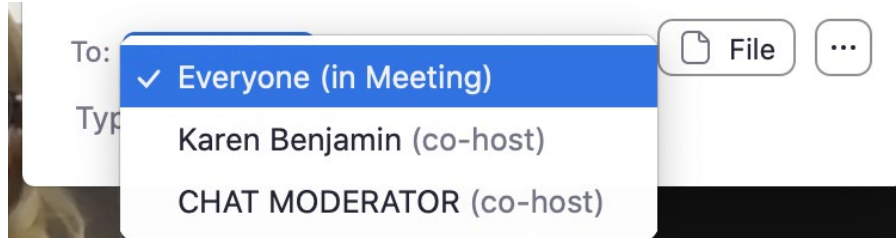
Session 3: Goals

Participants will:

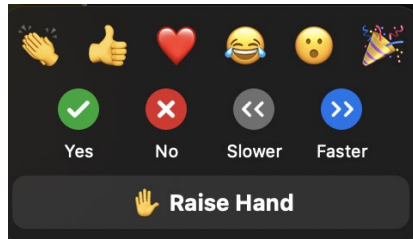
- advance their understanding of the meaning, history, and current uses of influential data visualization
- explore the essential role that visualization plays in our increasingly connected digital world and the ways visualization can be used to engage students in complex data analysis through the lens of societal issues

Questions and Comments

1. ##CHAT MODERATOR##



1. Hand raise Reaction (During open question time)



What is data visualization?

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Breakout #1

In your breakout room, please introduce yourself, sharing your name and where you teach (city, state).

In the breakout room, we will use the 'Visualization Breakout Room #1' handout.

What is data visualization?

Please locate the “Visualization Breakout #1” handout. In your breakout room and examine the three sets of representations of quantities. Begin with the numeric representation followed by the visual representation.

For each representation, discuss the following questions:

- 1. What does the representation tell you?*
- 2. What sense can you make from this representation?*
- 3. How did the representation influence your thinking about the data?*

Visualization is the ability, the process, and the product of creation, interpretation, use of and reflection upon pictures, images, diagrams, in our minds, on paper or with technological tools, with the purpose of depicting and communicating information, thinking about and **developing previously unknown ideas and advancing understandings.**”

(Arcavi, 2003)

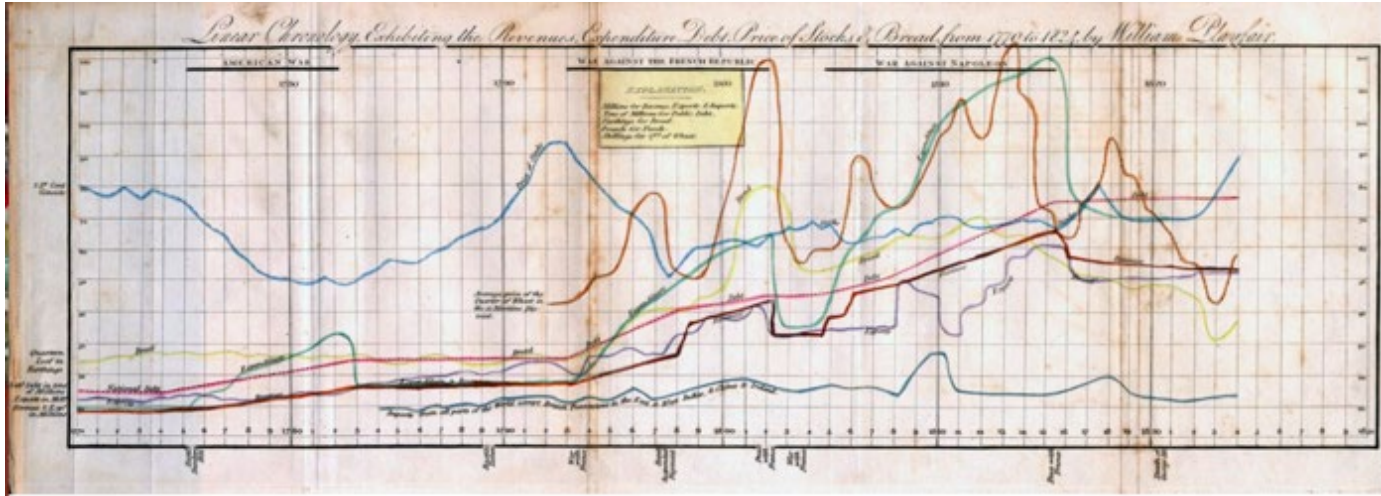
How has and does visualization influence society?

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A Historical Look at Data Visualization

William Playfair



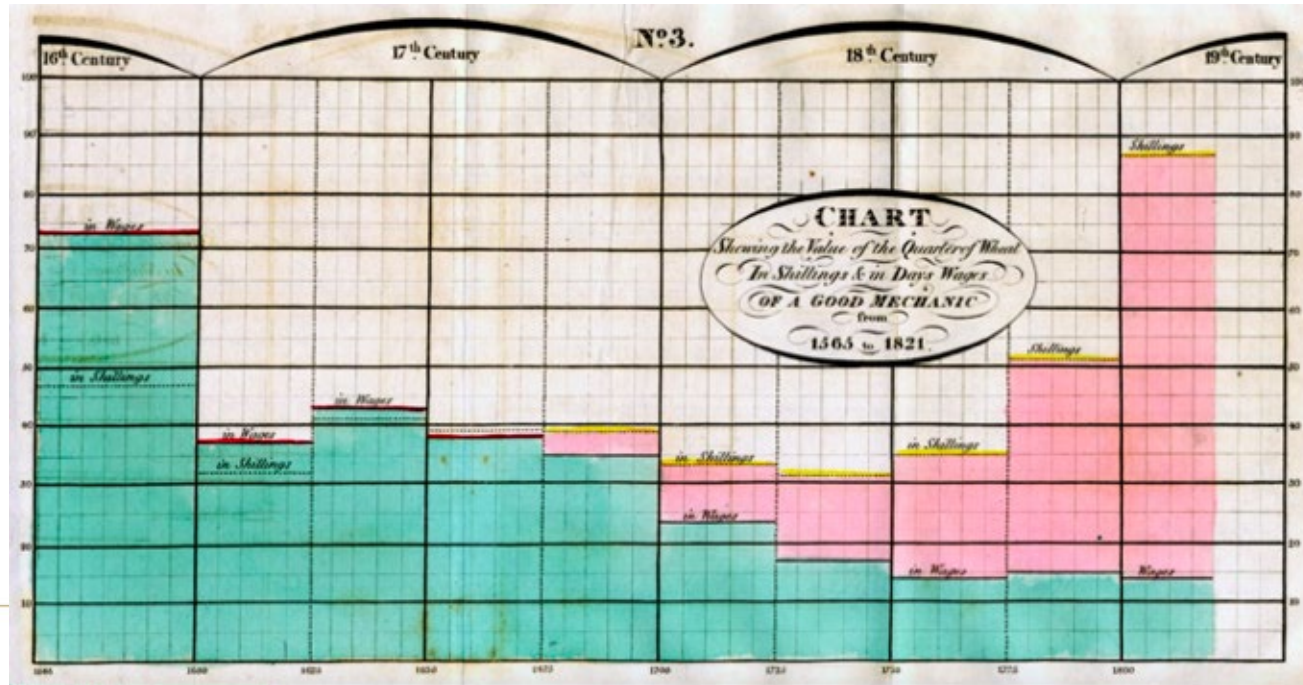
Pie, bar, and line graphs

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“An 1821 Playfair bar chart, which compares the price of wheat to a mechanic’s average daily wages, shows salary inflation keeping up with market prices. (Image: [William Playfair/Public Domain](#))”

<https://www.atlasobscura.com/articles/the-scottish-scoundrel-who-changed-how-we-see-data>



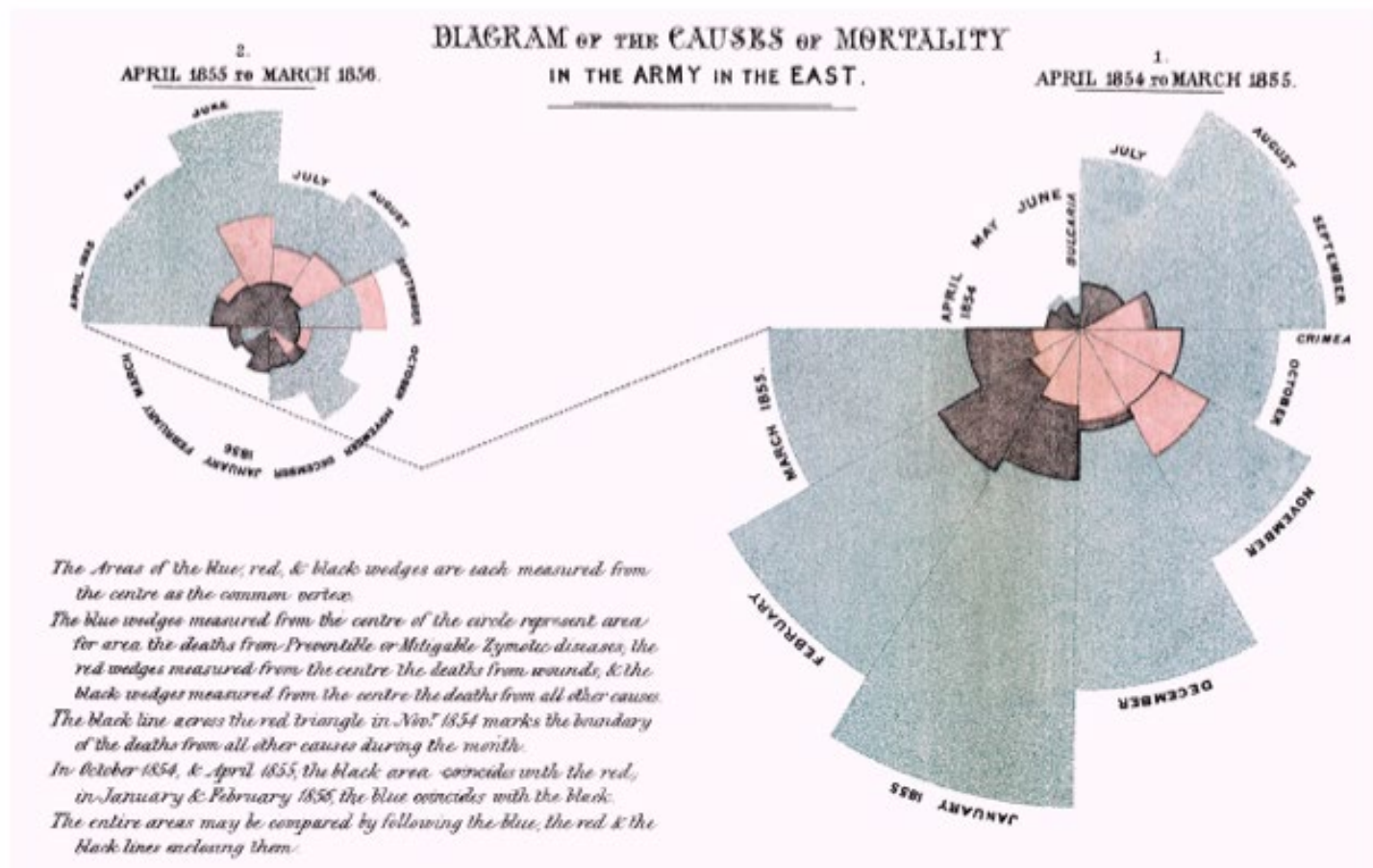


John Snow,
Cholera Map

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Florence Nightingale

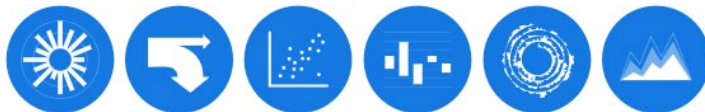




Nightingale Rose Chart Non-ribbon Chord Diagram Open-high-low-close Chart Parallel Coordinates Plot Parallel Sets Pictogram Chart



Pie Chart Point & Figure Chart Population Pyramid Proportional Area Chart Radar Chart Radial Bar Chart



Radial Column Chart Sankey Diagram Scatterplot Span Chart Spiral Plot Stacked Area Graph



Stacked Bar Graph Stem & Leaf Plot Stream Graph Sunburst Diagram Tally Chart Timeline



Timetable Tree Diagram Treemap Venn Diagram Violin Plot Word Cloud



Arc Diagram Area Graph Bar Chart Box & Whisker Plot Brainstorm Bubble Chart



Bubble Map Bullet Graph Calendar Candlestick Chart Chord Diagram Choropleth Map



Circle Packing Connection Map Density Plot Donut Chart Dot Map Dot Matrix Chart



Error Bars Flow Chart Flow Map Gantt Chart Heatmap Histogram

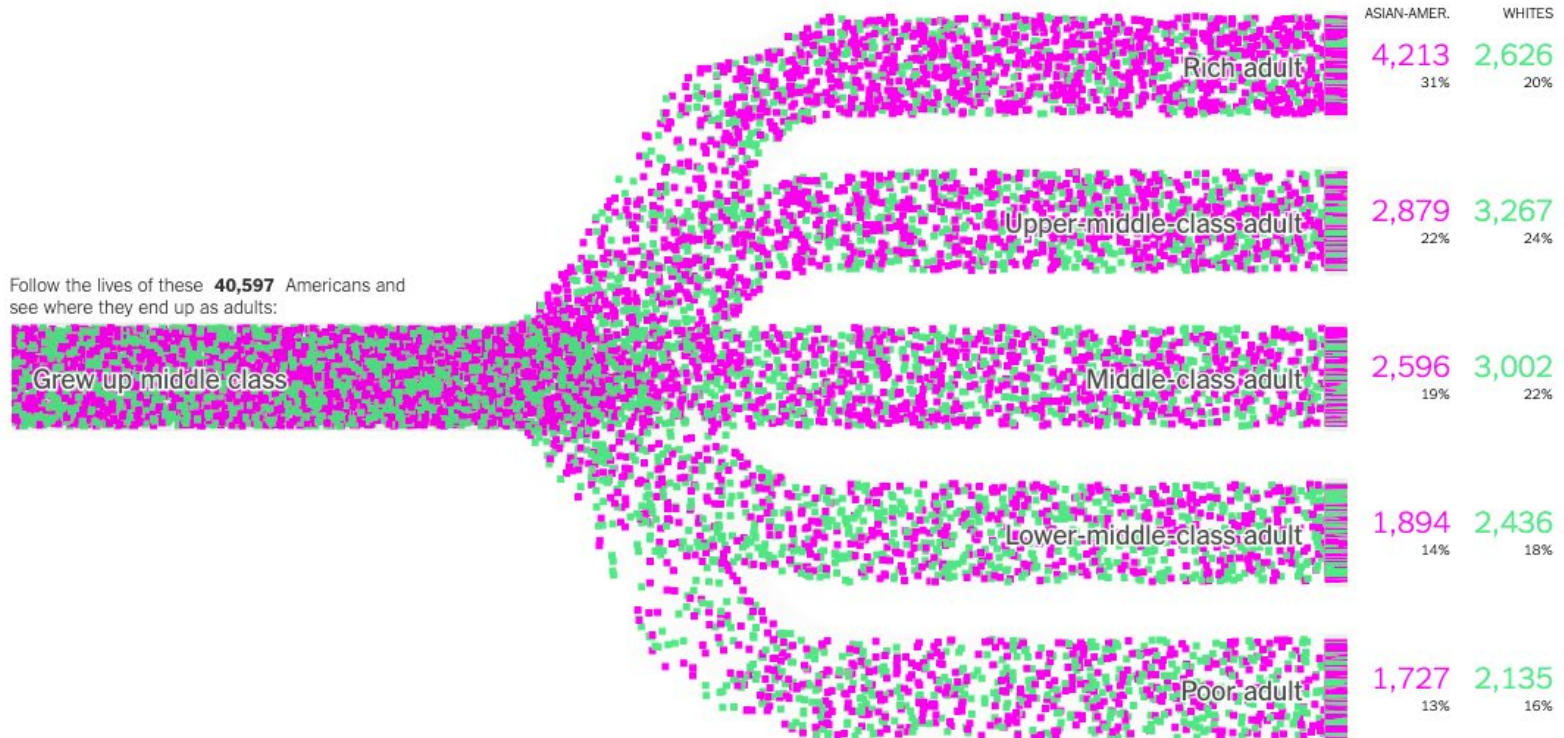


Illustration Diagram Kagi Chart Line Graph Marimekko Chart Multi-set Bar Chart Network Diagram

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Asian-American and white children raised in middle-class families, as measured by household income



“Visualization offers a method of seeing the unseen.”
(McCormick et al., 1987, p. 3)

“The greatest value of a picture is when it forces us to notice what we never expected to see.” (John Tukey, 1977)

“This is the moment to see the poor.”
- Pope Francis



Elevating the
Dignity of the
Individual



Promoting the
Common Good



Empowering the
Marginalized
and Vulnerable



Acting with
Rights and
Responsibilities

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How can we use visualization to facilitate student learning while promoting equity and social justice?

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Analyzing Practice

STEM EDUCATION

Unrealized



Fully
Realized

A FORCE

Unrealized



Fully
Realized

FOR GOOD

Unrealized



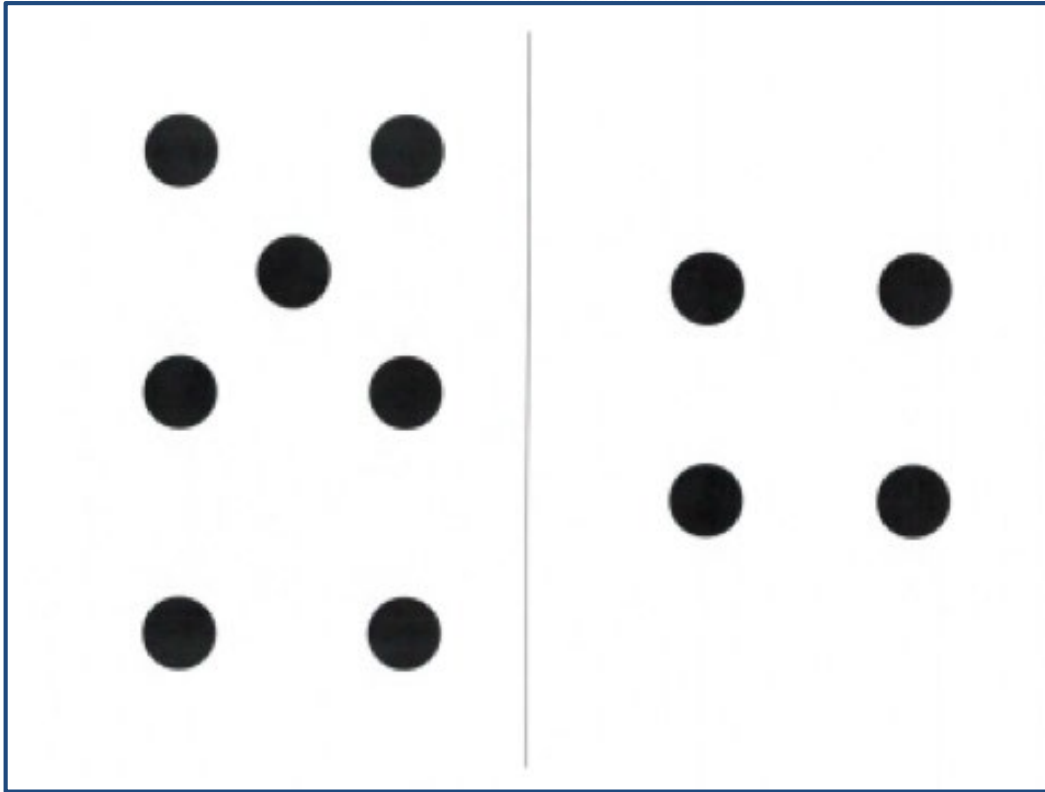
Fully
Realized

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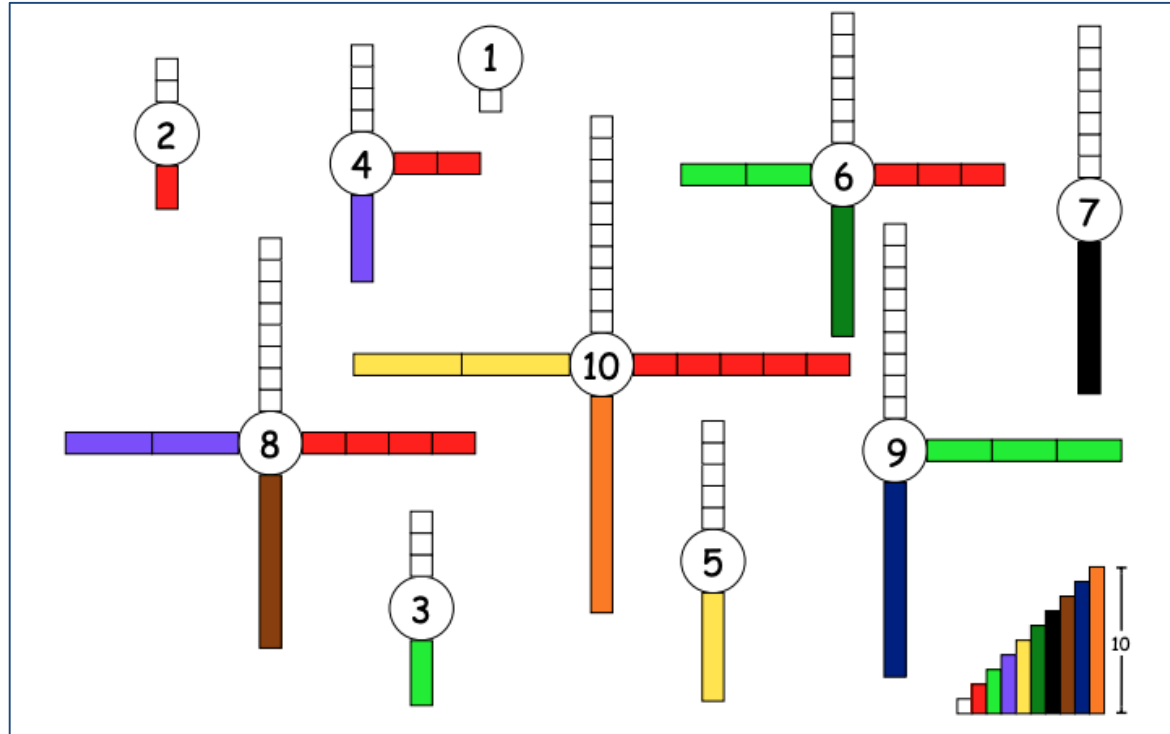
Visualization and Student Reasoning: Number Talks



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Visualization and Student Reasoning: Data Talks



What do you notice?

What do you wonder?

Taken from youcubed.org

What is going on in this data visualization?

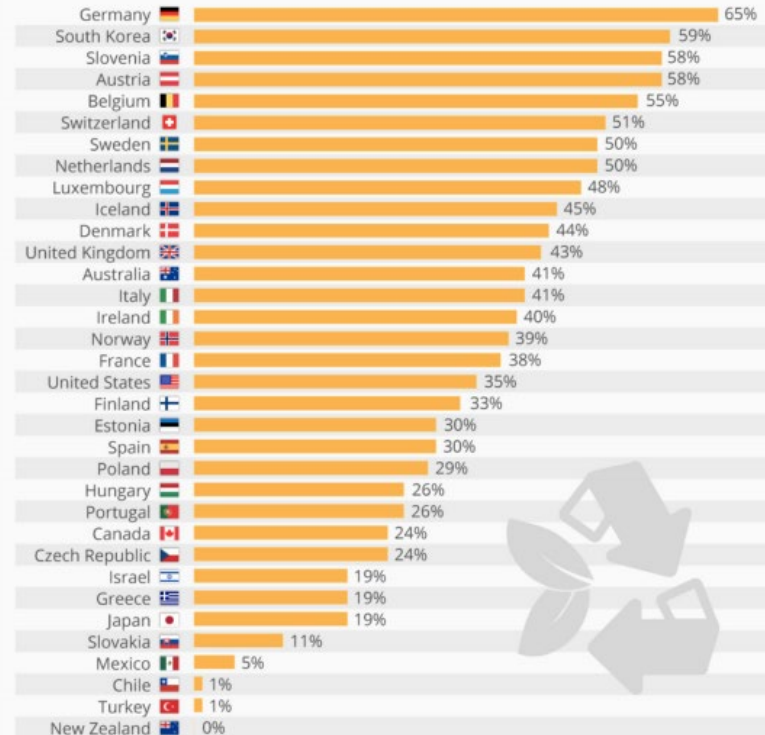
Visualization and Student Reasoning: Data Talks

What do you notice?

What do you wonder?

The Countries Winning The Recycling Race

Recycled & composted waste as a share of total municipal waste in OECD countries (2013)



What is going on in this data visualization?

Taken from youcubed.org



@StatistaCharts Source: OECD

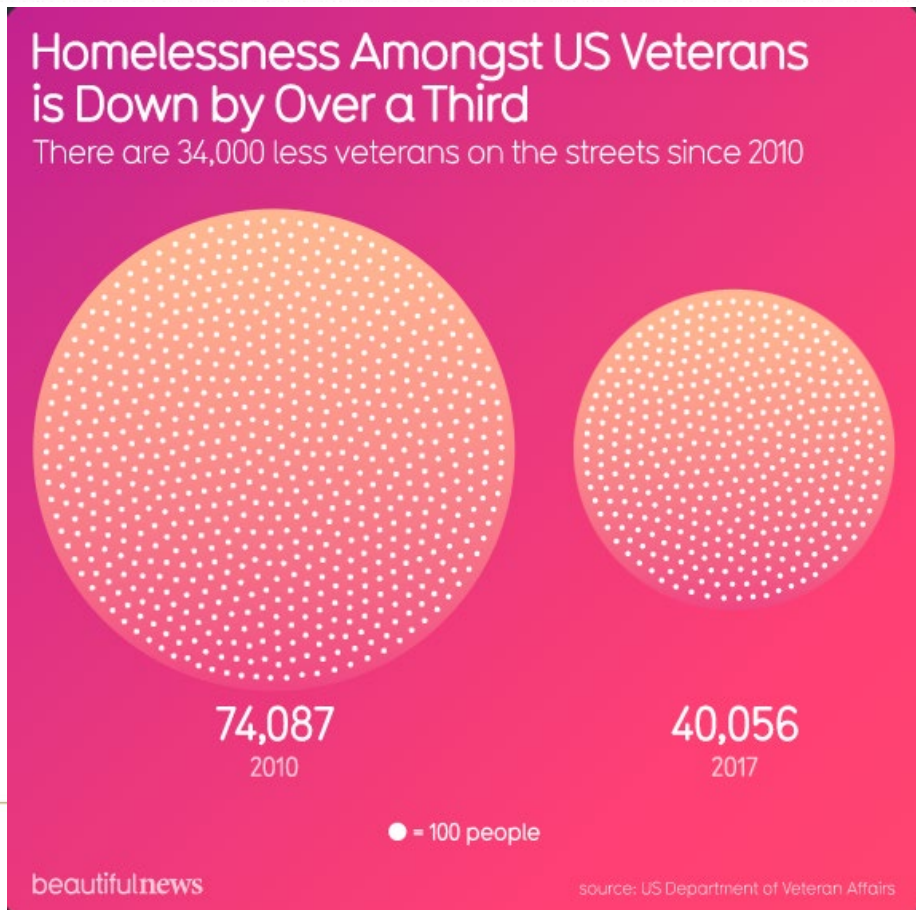
statista

<https://www.statista.com/chart/4470/the-countries-winning-the-recycling-race/>

Visualization and Student Reasoning: Data Talks

What do you notice?

What do you wonder?



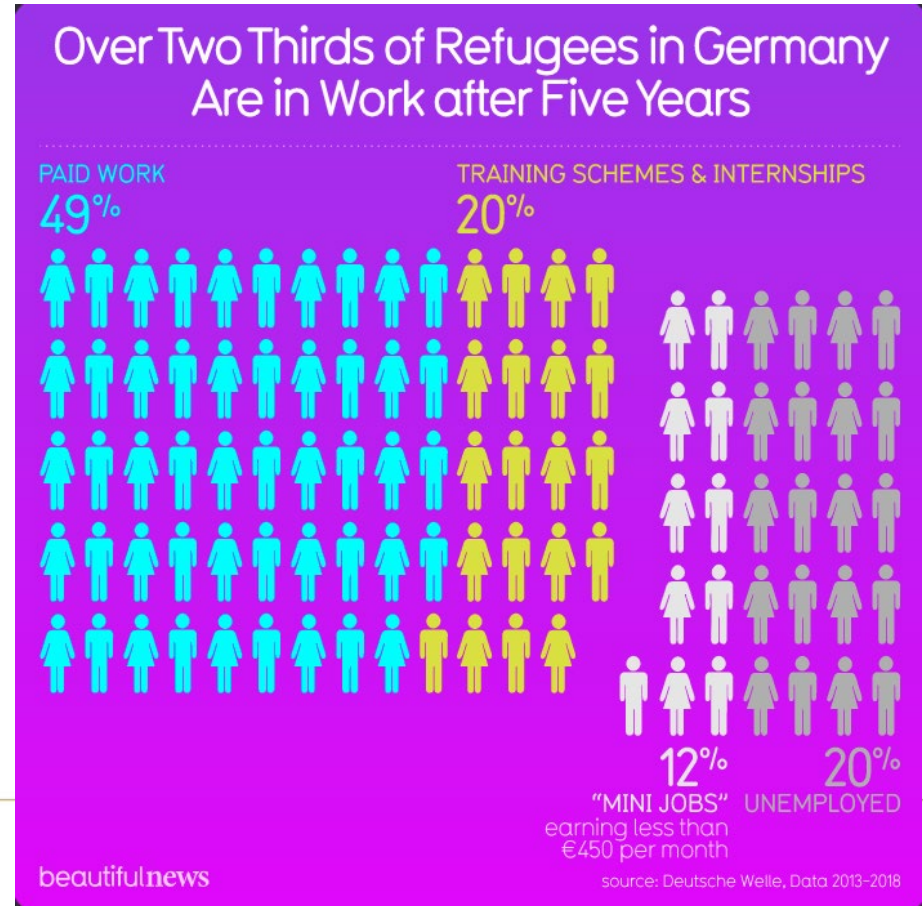
What is going on in this data visualization?

Visualization in Lesson Planning

Possible Learning Goals

6th Grade

- Understand ratio concepts and use ratio reasoning to solve problems.
- Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.



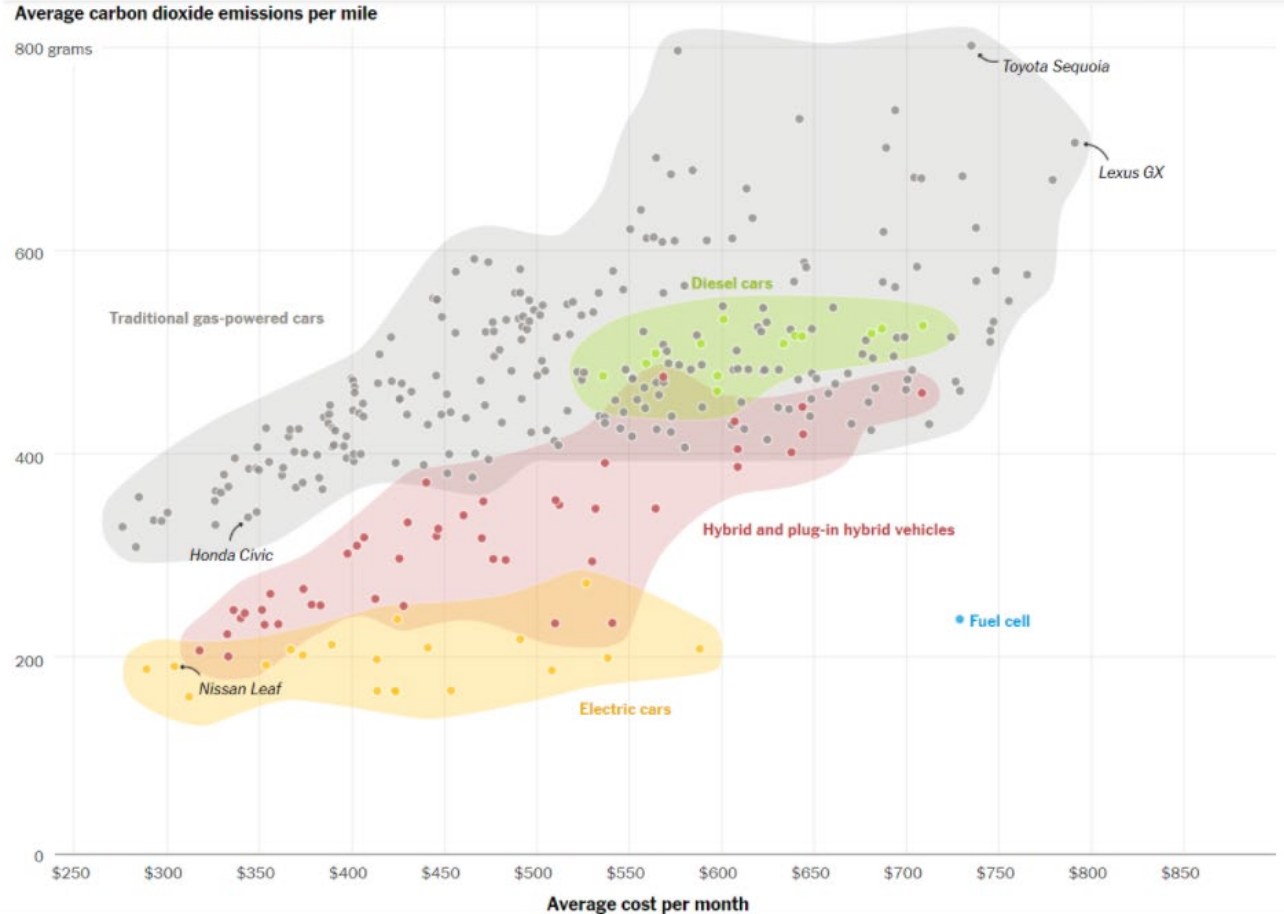
Visualization in Lesson Planning

8th Grade

Investigate patterns of association in bivariate data.

Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.



Visualization in Lesson Planning: **Your Turn**

Amya and Monu Air Pollution



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Breakout

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Visualization in Lesson Planning: **Your Turn**

In the chat there is a link to breakout room slides. Please use the two slides that match your breakout room number. For example, breakout room 1 will use the first two slides labeled “breakout room 1”. You will see a visualization on each of your room’s two slides.

For each visualization try to come up with as many different lesson goals or mathematics topics that this visual might be used to teach. Try to come up with more than one grade level!

Breakout Room Slides

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Final Thoughts

Please share one takeaway from this session on the Jamboard.

Closing

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Final Thoughts

Overview of Each Session

Session 1: Setting the stage for equity and a common language from Catholic Social Teaching that can be used across contexts.

Session 2: Apply ideas from Catholic Social Teaching in breakout rooms with content specific examples and reflect on how STEM, A Force, and For Good might play out in your own classroom.

Session 3: We looked at specific strategies in a particular content area of how these themes are realized.

Session 4: Sharing ideas across practice for moving this work forward.

Final Thoughts

Session Evaluation and Networking Opportunity

You will receive an evaluation in your inbox. This session title is: **Altering Perspectives: Using Data Visualization to Anticipate Authentic Situations. Please choose this session title for your evaluation.**

In this evaluation, there is also an opportunity to opt in to share your contact information with other educators and an opt in to receive the contact information sheet. This contact sheet will also include all of the facilitators and we encourage you to contact them with your questions or ideas.

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