Welcome

Before we get started...

- Display Name: First & Last
- Program is recorded • Turn camera off to not be in recording
- Questions ullet
 - Use chat function throughout session
 - Raise hand feature







OFFICE OFINDIAN EDUCATION

OIE Virtual Data Training

April 24,2024





Today's Learning

We will discuss

Understanding Data and Visualizations O7 Selecting the Right Visualizations **O3** Design Principles for Effective Visualization **O4** Overview and Resources



Introductions



Russel Potter, Ph.D. Data Director for the Office of Indian Education

In the chat, please share Your name • Role / District

Understanding Data and Visualization

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Understanding Your Data

Race	2022	2023
Asian	34295	37936
Black	63473	72072
Hispanic	526978	568407
Native American	47315	53218
Pacific	4216	4715
Multiple Races	44174	51874
Unlisted	98	6196
White	398322	431819

Share in the chat:

- What are these data telling us?
- Is that clear?
- Why do we care?



• Are these good data? • Does anything seem odd?

Understanding Your Data

Race	2022	2023
Asian	34295	37936
Black	63473	72072
Hispanic	526978	568407
Native American	47315	53218
Pacific	4216	4715
Multinla Racas	1/17/	5187/
Unlisted	-+1/+	6106
Uniisted	98	6190
White	398322	431819

Identify the Big Question • What do these data address? In their most basic form, what ulletare these data for? • How do they address it?

How has enrollment changed in the state, for each racial group?

Understanding Your Data

				Percent
Race	2022	2023	Change	Increase
Asian	34295	37936	3641	11%
Black	63473	72072	8599	14%
Hispanic	526978	568407	41429	8%
Native				
American	47315	53218	5903	12%
Pacific	4216	4715	499	12%
Multiple				
Races	44174	51874	7700	17%
Unlisted	98	6196	6098	6222%
White	398322	431819	33497	8%

How has enrollment changed in the state, for each racial group?

- Compare year to year proportion
- Specify the difference • Compare difference as

Year to Year Comparison

				Percent		
Race	2022	2023	Change	Increase	White	
Asian	34295	37936	3641	11%		
Black	63473	72072	8599	14%	Unlisted	
Hispanic	526978	568407	41429	8%		
Native					Multiple Races	
American	47315	53218	5903	12%	Pacific	
Pacific	4216	4715	499	12%		
Multiple					Native American	
Races	44174	51874	7700	17%	Hispanic	
Unlisted	98	6196	6098	6222%		
White	398322	431819	33497	8%	Black	

100000

Asian

0



Raw Difference

				Percent	
Race	2022	2023	Change	Increase	
Asian	34295	37936	3641	11%	
Black	63473	72072	8599	14%	
Hispanic	526978	568407	41429	8%	
Native					Multi
American	47315	53218	5903	12%	
Pacific	4216	4715	499	12%	
Multiple					Native
Races	44174	51874	7700	17%	
Unlisted	98	6196	6098	6222%	
White	398322	431819	33497	8%	





Total Change in Enrollment, 2022-2023

Proportional Difference

				Percent		
Race	2022	2023	Change	Increase	White	
Asian	34295	37936	3641	11%	₩HItë	
Black	63473	72072	8599	14%	Unlisted	
Hispanic	526978	568407	41429	8%	Multiple Races	
Native					Multiple Races Pacific	
American	47315	53218	5903	12%	Pacific	
Pacific	4216	4715	499	12%	Native American	
Multiple					Native American	
Races	44174	51874	7700	17%	Hispanic	
Unlisted	98	6196	6098	6222%	Hispanic	
White	398322	431819	33497	8%	Black	



Percent Increase In Enrolliment, 2022-2023

Asian

0%

Questions? Raise Your Hand! Drop in the Chat!

Selecting the Right Visualization



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Using Proportions

• In groups of different sizes or with different starting points...

- What does a change of 10 mean in each group?
- What does a change of 1000 mean in each group?

• If a change is not the same thing for to the data story you're telling...

PRINCIPLE: Use proportions when dealing with populations of different sizes



Percent Increase In Enrollment, 2022-2023

Two Numbers, Two Bars

Discrete

- Only specific values in a range are possible
- Countable, but indivisible
- Decimals usually don't mean anything
- People, grade-levels, dates are usually discrete

Use bar graphs to display discrete data

- Bars don't touch
- Data isn't continuous

• Continuous • Any value in a given range is possible

- Less countable, but infinitely divisible
- Decimals have reasonable values
- Time, money, age, height are usually continuous

Use Histograms for continuous data

- Bars touch
- Data has no 'gaps'



Bar Graphs

Categorical against Discrete Race and Counts Age and Scores Gender and Height Describe with Numbers



Percent Increase In Enrollment, 2022-2023

Types of Bar Graph

Horizontal

- Nominal and Categorical Data
- Sort data by
 - greatest to least or least to greatest
 - target datum at the top

- Vertical



Ordinal or Sequential data • Order time-data left-to-right • Groupings in logical order • If you have buckets, use a vertical bar chart

Ratio of Students Passing ELA



Stacked Bar Graphs

• When the total or aggregate is important but comprises smaller categorical groups.

- •All the data for a value in one column.
 - Illustrates the composition of the total value
 - May occlude the details of parts that make up the population or sample.
- Comparing data year to year

Total Enrollment, 2022-2023

Asian

Pacific



Pie Charts

- Categorical against Proportion
 - Only 2-3 Categories
 - Gender
 - Pass/Fail
 - Approve/Disapprove/No Opinion
- Area is hard to judge
 - Needs to be accurate
 - Difference must be clear, if any
 - Big divisions are vertical
 - Keep it flat



Percent Enrollment Change, 2022-2023

Exploding Pie Charts

• Exploding a pie chart with multiple categories *may* improve clarity.

- Beware:
 - Too many categories
 - Especially if differences aren't clear or useful
 - Too much explosion
 - A little goes a long way



60%

Scatterplots



 Comparing two potentiallyrelated numeric sets • FRPL and Proportion of Passing • Height and weight • Math score and English Score

Questions? Raise Your Hand! Drop in the Chat!

New stuff on the CNA

• Take 5-10 Minutes

- Visualizations produced for the **Comprehensive Needs** Assessment (CNA)
- - Is it good?

 Think about these questions while you're looking at the CNA: • How useful is it? • How readable is it?

Principles for Effective Visualization



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Positioning Data



• Where you place the data influences the viewer •The shape of the data and the intended story should control placement. • Find the outliers • Find the trends •Which direction is "good"?

Repositioning Data

- How does changing the placement...
 - Help or hide the outliers?
 - Help or hide the trend?
 - Change the story?



Passing Ratio by AIAN Population Ratio

Positioning "Up"



- - of the page
 - impact

 Trend lines influence the easy-to-read side of the chart Negative trendlines should usually be on the left side

•Keep the 'above the line' area larger for betting

Positioning "Up"

- What the trendline bounds influences how we see the data.
- There's a lot less "above" the line on this option.
 - Maybe "above" isn't what you want
 - Sometime the story is under the line



Passing Ratio by AIAN Population Ratio

Positive Positioning

- Positive trendlines should be on the right side of the page
- Put the story in the 'good' section of the page

6%



Passing Ratio by AIAN Population Ratio

Principles of Color

- Make sense
- Distinct
 - <u>Data Viz Color Palette</u> <u>Generator</u>
- Consistent



Male Female

Exceptions

- The story should be bounded by the visualization
 - If left to right, then 'positive' is also left to right
 - Read top down, then 'positive' is higher on the page.
- There's always a good reason to do it another way.



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Sim plicity: Data-Ink Ratio

Principles of good visualization

- Above all else show data.
- Maximize the data-ink ratio.
- Erase non-data-ink.
- Erase redundant data-ink.
- Revise and edit

- print the graphic.

• Data Ink: the non-erasable core of the visualization

• Data Ink Ratio: the data ink divided by the total ink used to

• Get rid of EVERYTHING that doesn't add to the clarity.

That's Not Data

- Focus on the content
 - Lighten labels
 - Remove borders
 - Lighten or remove lines
 - Remove anything redundant
- That's not data:
 - Grid lines
 - Axis values/ticks
 - Color schemes

"Never underestimate your audience. It's the most common mistake made by presenters. It is not about you anymore. It's about your audience's relationship with your content."

• -Edward Tufte

Chart Junk: Example 1



Enrollment Changes, 2022 to 2023

Chart Junk: Example 2



School Pass Ratio by AIAN Population



96% AIAN, 100% Passing

Chart Junk: Applied



- Type of food
- Borders

 Background color Grey background Category duplication

•...for different foods

• Shading/3D effects Colors aren't sensible (focus!) • Unembedded data/Y-axis

Iterate and Commit

- Good visualization is a process
 - Many options for any datum
 - Try, edit, repeat
- Use your resources
 - Graphic Designers
 - Editors
- Don't let perfect be the enemy of good
 - You can spend hours on anything
 - Be conscious of your investment
 - If it works, move on

Recap and Resources



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Review

- Identify the big question
- Seek the best visualization
 - What tells the story best?
 - Compare 2 values
 - Difference of 2 values
 - Proportional change
 - Types of visualizations
 - Bars and histograms
 - Pie Charts
 - Scatterplots

<u>The Visual Display of Quantitative</u> Information, Edward R. Tufte

 Good visualization principles Position and Color Simplicity & Flatness • Be reasonable with your resources: It's a process Maximize data-ink ratio



- away from this training?
- What else do you need to know?

What are you taking

How will you apply what you've learned in your grant work?

More Resources



Don't forget, all data training recordings are on our website!



Scan the QR code or visit www.azed.gov/oie/professional-learning-resources

Thank you!



Feedback Survey

