DESIGNING TABLEAU DASHBOARDS YOUR AUDIENCE LOVES TO USE

A DATA DOZEN WORKSHOP

BUILT FOR THE STRATEGIC DATA PROJECT
2020 WINTER WORKSHOP

DATA DOZEN
DATA VISUALIZATION EDUCATION

LET'S GET STARTED

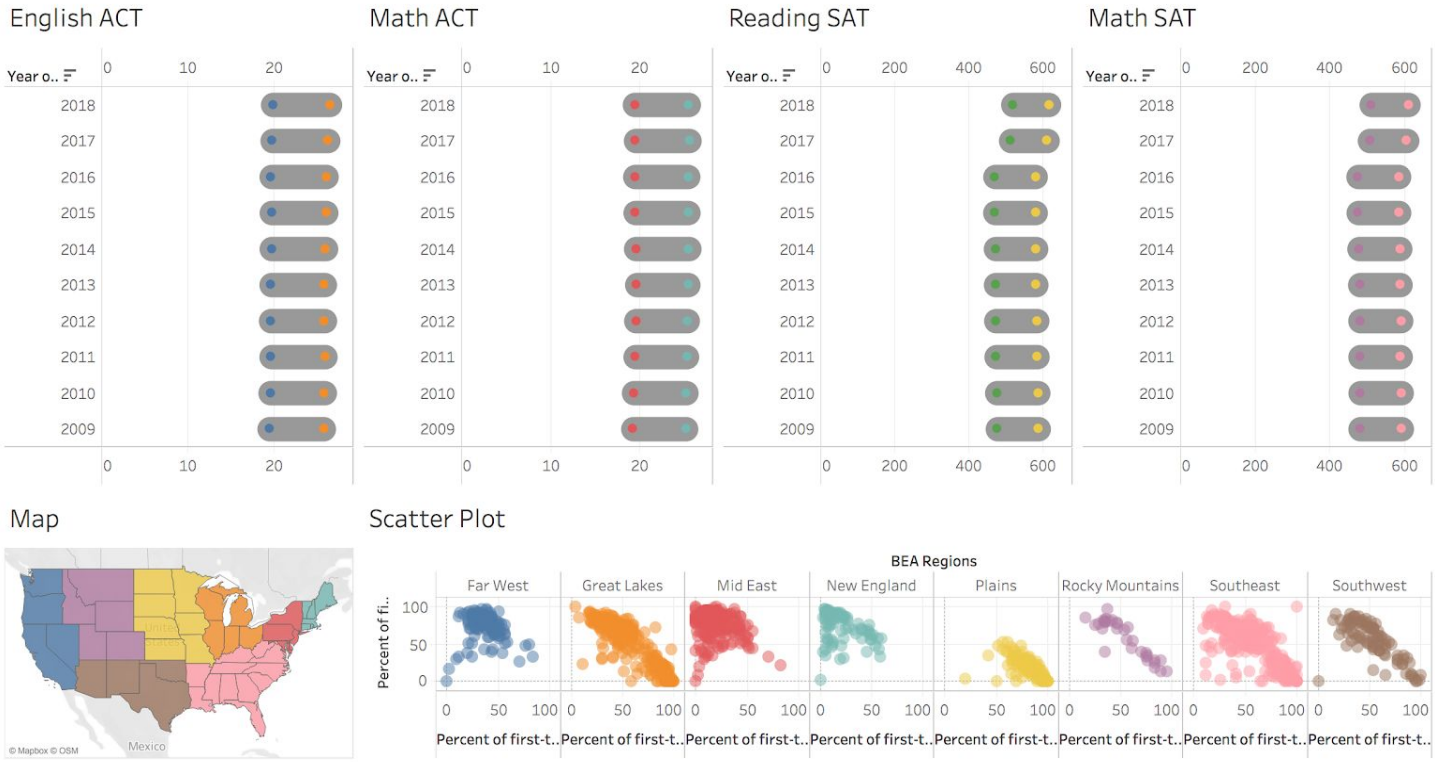
This workshop is all about how to successfully apply design fundamentals and user experience best practices within the Tableau framework. As we build a single (rather dense) dashboard, we'll dive into a variety of under-utilized design and presentation features in Tableau, including the mark annotations, layout containers, dashboard actions, and storypoints. As we leverage these unique functionalities, we'll uncover effective strategies for understanding your audiences' goals and navigating competing objectives through design. By the end of the workshop, you will be able to design dashboards that deliver a simultaneously delightful and insightful experience for your audience.

After this workshop, you will be able to:

- Leverage the full power of the formatting pane in Tableau (font, alignment, shading, borders, lines)
- Incorporate consistent branding elements from your organization (color, fonts, logos, mission statements)
- Design dashboard layouts that offer both aesthetic impact and precise interpretations
- Create consistently intuitive and meaningful experience for your audiences

WELCOME

- Personal introductions: what's your name, what's your job, and what are you hoping to learn?
- Laptop Check: Be sure you've download Tableau Public and download the data set.
- Our agenda has six major sections, all of which will last about 20 minutes:
    - Introductory Framework
    - Building the Charts
    - Ink
    - Words
    - Layout
    - Footholds



BUILDING THE CHARTS

Before we dive into the nitty gritty of our design, let's start by building the three charts that make up this dashboard. In this section, we will only focus on the functionality of each chart, which will produce the default design above.

CONNECT TO DATA

- Connect to Data
  - Launch Tableau Public.
  - Under Connect and To a File, click Microsoft Excel.
  - Find the "Tableau Data - Harvard SDP Winter Workshop 2020" data set you've downloaded and click Open.
  - Drag the Table 1 - Clusters sheet onto the orange Drag Sheets Here text.
  - The data will load in the preview area.
- Go to Worksheet
  - Click the orange tab labeled Sheet 1 to go to Tableau's building environment.
- Data Pane Clean Up
  - Data Type
    - Select the Telephone variable that has been classified as a measure and drag it up to be classified as dimensions. (We'll never do math on variables like that, just like we wouldn't do math on a student ID.)

- Group By
  - Click the dropdown menu to the right of Dimensions and change the Group By function from Data Source Order to Group By folder.
  - Select all the measures related to the ACT, right click on the highlighted measures, select Folders, and then Create new folder. Name it ACT, and then collapse all of those variables. You can use this method to clean up the rest of your data pane however you'd like. You could create folders for the SAT variables, the admissions variables, the location variables in the dimensions section, etc.
- Number of Records Check
  - Drag Number of Records to text on the marks card.
  - You should have 16,580 records (1,658 universities with 10 rows each for admissions data from 2009-2018.)

SCATTERPLOT

- Basic Scatter Plot
  - To columns, drag Percent of first-time students submitting ACT
  - To rows, drag Percent of first-time students submitting SAT
    - Ask yourself: what does this mark represent?
  - Unit ID to detail on the marks card
    - Why are our axes to 1000 instead of 100?
  - Year to Filter set to just 2018
  - Region to Color
    - Note the overplotting we see here. When legibility stoops, it's usually time for a new chart type.
    - This might mean the same essential chart, but teased apart into small multiples.
- Small Multiples Scatter Plot
  - Regions to columns, set just to the left of the ACT measure
  - Mark type from shape to Circle
  - Adjust opacity from 100% to 60 or 70%
  - Exclude Outlying Areas
  - Step back and see how different the regions are. It's easy to see why, as a teenager growing up in Kansas, I vividly remember taking the ACT, but have no actual memory of taking the SAT, although I know I did take it because I applied to a few schools on the coasts.
- Highlighters
  - Add the Institution Name to the tooltip. Now right click it and show the highlighter. This makes it easy for us to find a specific institution.
- Filters / Alias
  - Add Size Category to the dashboard and show the filter.
  - Add public vs. private to the filters. Show the filter and right click on Private not-for-profit.
  - Select the alias and make it read just "private."
- Groups
  - Create a new sheet and drag Size and Setting to Rows.

- Select all of the “Highly Residential”, right click, and create a group. Rinse and repeat for the remaining settings. Then you can go back to your scatter plot and add that Setting Group to your filters.

MAP

While our scatterplot does have a color legend, we can build a much more informative one by simply creating a small map. This will show our audience immediately which states are included in which regions.

- Filled Map
  - Create a new sheet
  - Double click Latitude and Longitude
    - Ask yourself, what does that mark represent?
  - State on detail on the marks card
  - Change the mark type from the automatic circle to the Map option
  - Drag Regions to Color
- Set
  - We want to filter our map down to just the contiguous United States. Instead of clicking all of the areas we want to exclude on each map, we’ll make a set that just keeps the 48 states plus D.C. we want to display here.
  - Click the dropdown on the State data pill in the data pane and select Create and Set.
  - Rename your set from Set 1 to “Contiguous United States”
  - Click All and note that you have 54 values in the set.
  - Uncheck Alaska, Guam, Hawaii, Puerto Rico, Virgin Islands. We’re down to the values we want to keep.
  - Click OK and see a new section appear in your data pane with your set.
  - Drag your new set onto the filters card.

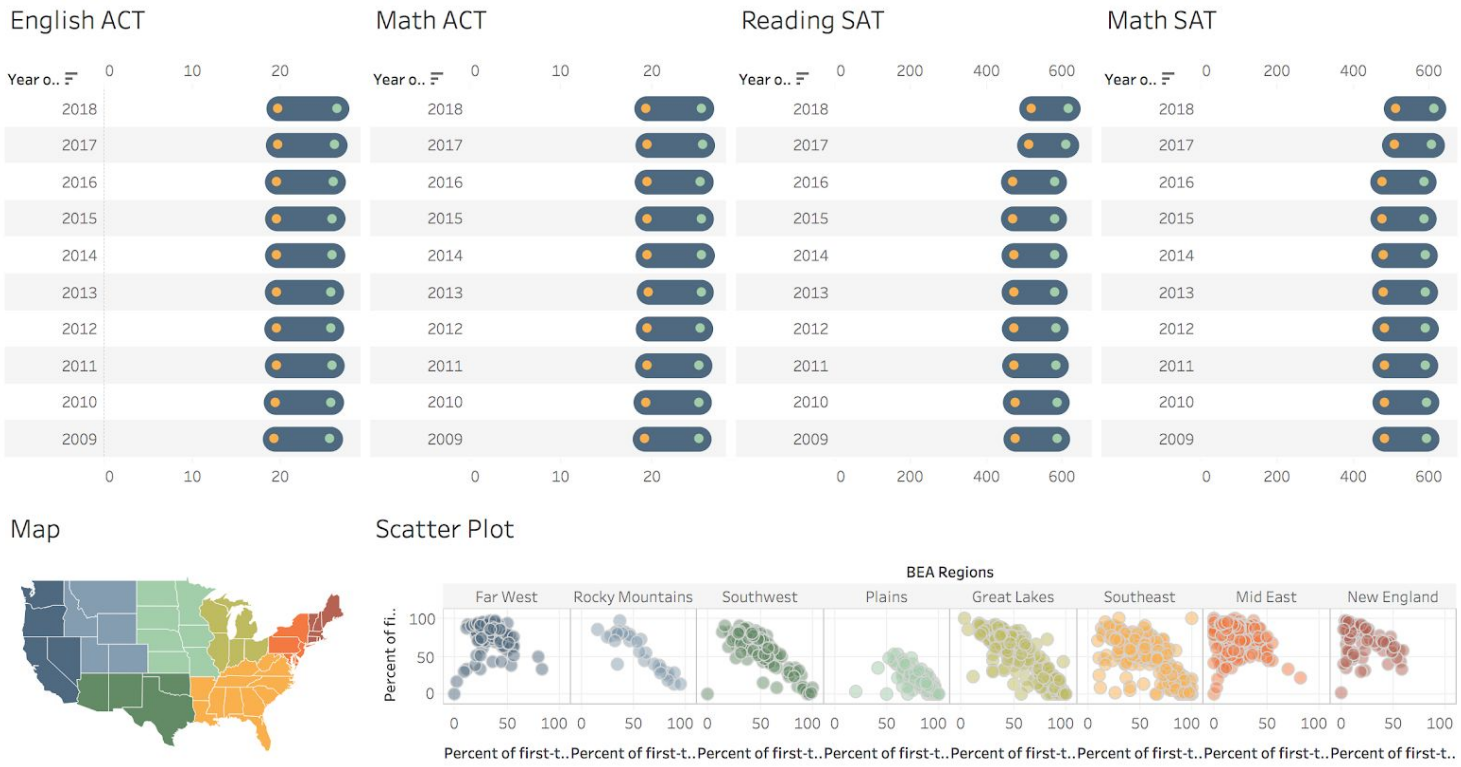
LINE CHARTS

- Measure Names and Measure Values
  - Create a new sheet and name it English ACT
  - Year to rows and reverse the sort so that 2018 is at the top
  - Drag Measure Values to columns
  - Change the filter on Measure Names to just show the English ACT scores
  - Change the mark type from the automatic bar to the circle
- Dual Axis Combination Chart
  - Drag a second Measure Values data pill to the columns shelf.
    - The chart will duplicate and you will now have three marks cards, one that controls both charts, and two other cards that control each chart separately.
  - Click on the second marks card (which controls the first chart independently).
    - Change the mark type from circle to Line.
    - Drag Measure Names from Detail to Path. The line will now go from the to Measure Values.
    - Make the Size of these rounded lines bigger.

- Now click on the third marks card (which controls the second chart independently. You can tell the difference between the two now by looking at the little line mark symbol next to the marks card.)
    - Change the Measure Names from Detail to Color.
- Finally, we'll create a combination chart.
    - Click on the second chart's X-axis, and click Dual Axis.
    - Now click on the top X-axis and select Synchronize Axes.
    - Change the view from Standard to Entire View.
    - Adjust the size of the marks independently.
    - Filter the entire chart to just the contiguous US using the Set we created earlier.
- Duplicate the remaining charts and adjust their Measure Names accordingly.
    - Math ACT
    - Reading SAT
    - Math SAT

DASHBOARD

- Create a new dashboard. Drag in all six of your charts, aligning the scores on the top and the map and scatterplot below.
- Dashboard Actions (Filters)
    - Our big picture goal here is to increase the functionality of the test scores. We want to be able to filter by:
        - Region (scatterplot labels)
        - State (map)
        - Institution (scatter plot dots)
    - Scatterplot (Region and Institution)
        - Dashboard > Action > Filter >
        - Source: Scatterplot
        - Run action on: select
        - Target: SAT and ACT sheets
        - Clearing selection will: leave all fields
        - All Fields
    - State
        - Rinse and repeat the same steps as above with the source sheet as the Map
- Take a moment to compare the functional dashboard you've created with the finished dashboard we're striving for. Functionality-wise, these two dashboards are identical. You will get the same answers about the data with either one. But in terms of interacting with them, they're very different.
    - What differences jump out to you?



INK

Now it's time to start cleaning up this dashboard. We'll start by adjusting the ink of each visualization. You'll notice that this first step alone makes perhaps the biggest visceral shift for your audience.

BIG PICTURE

- Color
  - Style guide from your organization (hex codes, custom color palettes)
  - Legibility (color blindness)
  - Associations (red for go isn't intuitive like green would be)
  - Consistency
- Weight
  - Density (where the eye goes)
  - Opacity (great fix for overplotting)
- Lines
  - Borders vs. Lines (borders surround your visualization, lines are inside there with the data)
  - Only what's necessary. Think of everything you'd erase if you drew all of these charts by hand.

- Shading
  - Underutilized tool to guide the eye and create important groupings

MAP

- Color
  - Default sort the regions from west to east
  - Apply miller stone palette by hand
- Weight
  - 100% opacity
  - White border around each state to give it additional definition
- Lines
  - Erase absolutely everything else by clicking map > map layers > 100% washout
  - Formatting pane, borders, sheet, during off row and column divider.
- Shading
  - Not applicable here

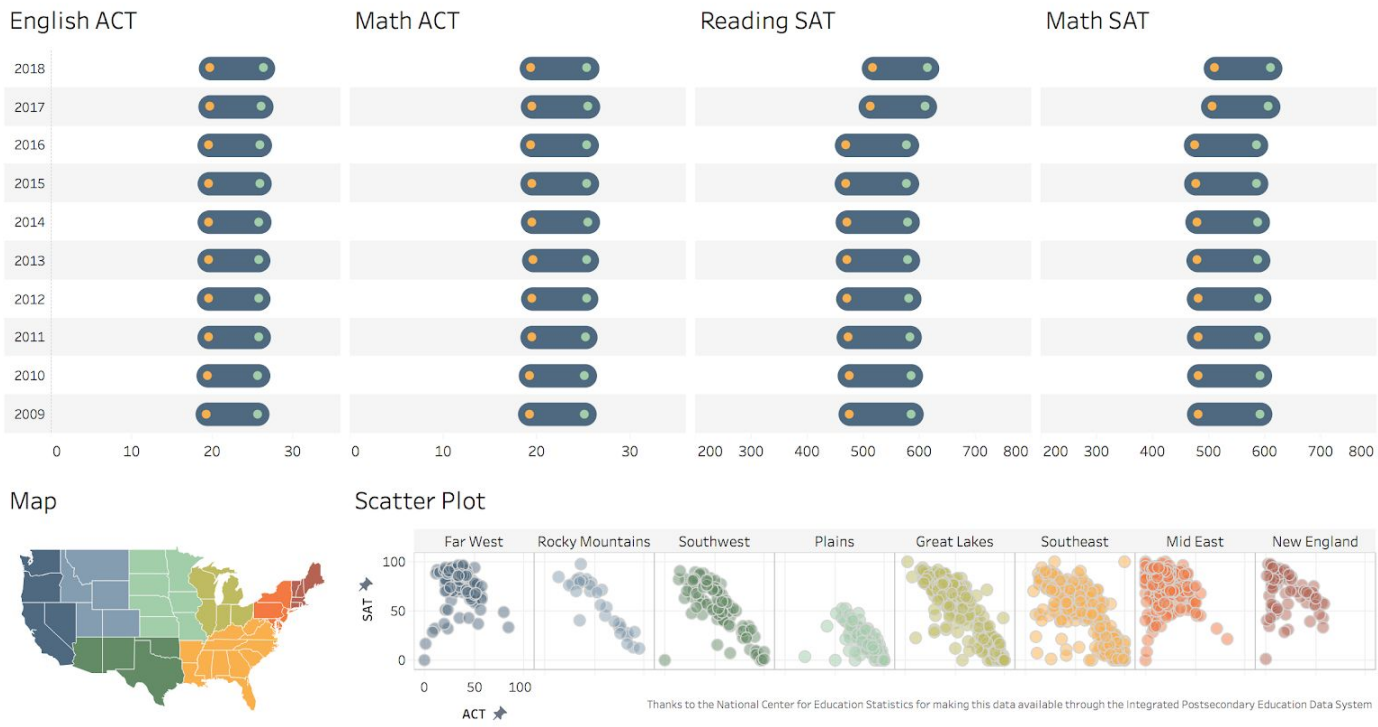
SCATTERPLOT

- Color
  - Automatically adjusted for consistency.
    - (If you need to have two different color schemes for the same variable in the same workbook, you can duplicate and operate them independently. Just remember, when you start fighting with Tableau to do something it doesn't want to do, ask yourself whether or not you're about to make a common data viz misstep.)
- Weight
  - Add a grey border around each dot.
  - Adjust opacity as desired.
- Lines
  - Here the grid lines create quadrants that are actually very helpful. Start erasing the rest and see when you've gone too far. Then add back in whatever your eye was leaning on and you didn't realize it.
    - I removed the header dividers for rows and columns, as well as the zero line.
- Shading
  - To add a little definition to the chart, add the lightest grey shading to the top of the region headers.

LINE CHART

- NOTE: Just do one of the four test score charts. We'll duplicate the finished version.

- Color
  - Legibility is a big problem with the default colors on the line charts.
  - Change the line itself to a deep blue, and then add a pop of color that will be easy to see on the 25th and 75th percentile.
  - Remember associations folks might have. 75th percentile is higher than 25th.
- Weight
  - The dark blue is the richest thing on the dashboard. This distribution is where folks eyes will go first.
- Lines
  - Erase all the lines.
- Shading
  - Add light grey row shading by year to make it easier to associate the correct line with its year.



WORDS

Now let's adjust how we use words on our dashboard. Remember, first our audience will have a visceral reaction to the ink on our dashboard, and then they'll start figuring out how the dashboard words. When in doubt, folks will start reading. Typically, the less comfortable our audience is with data and visualizations, the more they'll rely on the words you've provided to understand what the dashboard means.

BIG PICTURE

- Fonts
  - Style guides matter here too!
  - Prioritize legibility and consistency
- Alignment
  - Left aligned unless intentionally deviating
  - Right aligned numbers in table
- Labels/Axes
  - Provide all the necessary information, but just one time. No need to repeat axes labels over and over.
- Tooltips
  - These have super powers! Think of all the additional information you're able to offer your audience without cluttering your space. Never leave these in their unedited form.
  - Bigger font than you think you need, and only bold the most important variables that change.

- Use sentences whenever it creates more clarity.

MAP

- Fonts
  - Let's go right to the source! To the default settings at Format > Workbook…
    - All Tableau Book, Black
    - Tooltips, 14 pt
- Tooltips
  - Unit ID to Tooltip (we'll get an * because we have more than one option)
  - Change Unit ID to a count distinct measure instead of a dimension
  - Click on tooltips and format

SCATTERPLOT

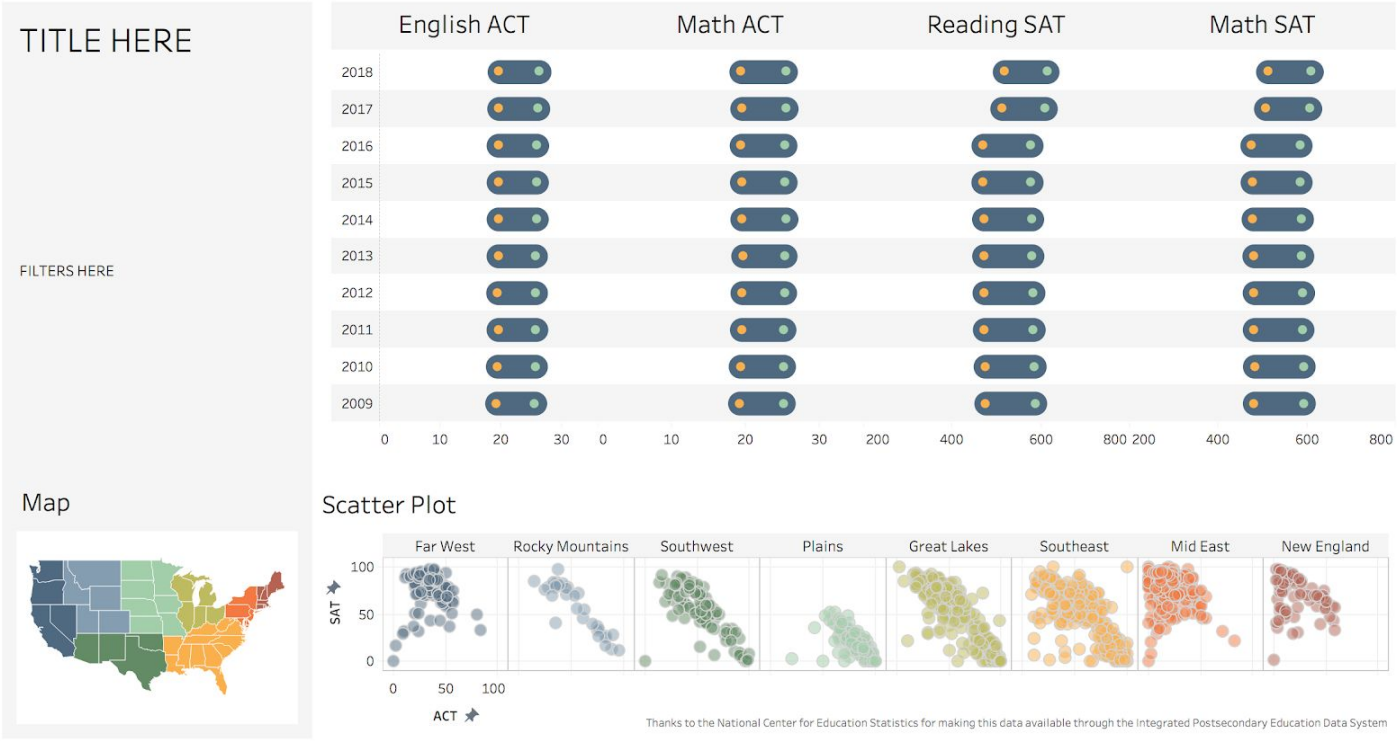
- Fonts
  - Axes, all Tableau Book and size 8, just bolding outer label
- Alignment
  - Labels centered over scatterplots
- Labels/Axes
  - Hide Regions label
  - X-Axis, change title to just ACT and fix the axes to -10 to 110
  - Y-Axis, change title to just SAT and fix the axes to -10 to 110
  - Note the repetitiveness of the x-axes. We'll clean that up in the dashboard.
    - Go to the dashboard and add a floating text object with a white fill.
- Tooltips
  - Add Institution Name, Public v. Private, Size and Setting, City, State, Website
  - Describe the scatter plot with a sentence:

    <ATTR(Institution Name)>
    Of the first-time, degree-seeking students who enrolled in 2018, <SUM(Percent of first-time degree/certificate-seeking students submitting ACT scores)>% submitted ACT scores, while <SUM(Percent of first-time degree/certificate-seeking students submitting SAT scores)>% submitted SAT scores.

    <Public or Private>
    <ATTR(Size and Setting)>
    <ATTR(City)>, <ATTR(State)>
    <ATTR(Website)>

LINE CHARTS

- Fonts
  - 8pt on all axes labels
- Alignment
  - Centered on year
- Labels/Axes
  - Hide top axis on dual chart (anywhere we can eliminate redundancy we should)
  - Hide all but first year label
  - Fix X-axis to 0-36 on ACT, 200-800 on SAT
- Tooltips
  - Set default number formats to reasonable range.
    - One decimal for ACT scores, no decimals for SAT
  - Give folks context of what the score range actually is.
  - <Measure Values>
    In <YEAR(Year)>, the <Measure Names> was <Measure Values> out of a possible 36 points for the institutions selected.



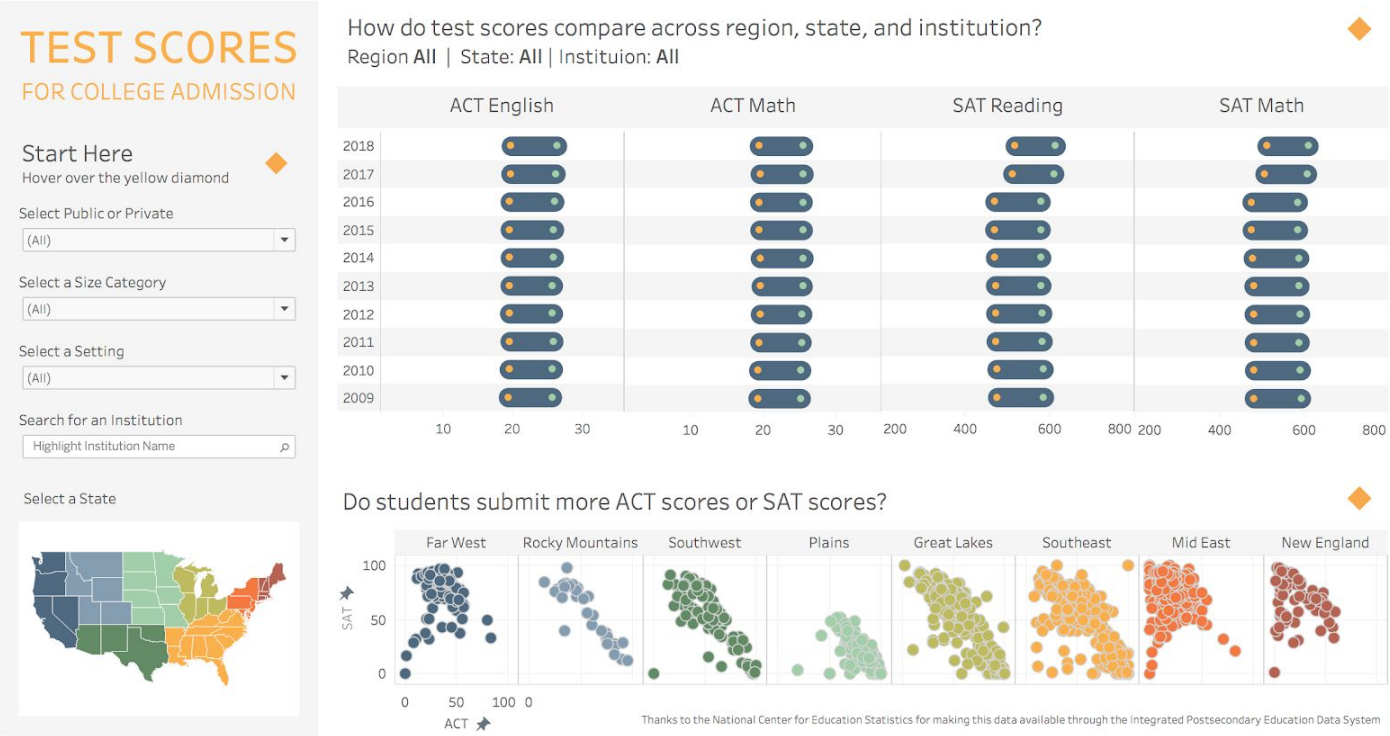
LAYOUT

With our individual charts tidied up, it's time to turn our attention to the dashboard itself. As we build out the layout here, we're focusing on the big picture structure of the dashboard. Here are our steps to create clarity with our layout.

DASHBOARD

- Zones
  - Our goal is to create three zones here, one for the test scores, one for the scatterplots, and one for the instructions, filters, and keys.
  - Vertical container for title, filters, instructions
    - Grey background with placeholders
  - Horizontal container for test scores
    - Grey titles
    - Eliminate outer padding
  - Container Notes
    - They're finicky.
    - Double click item handle to see next level up.
    - Check the Item Hierarchy on the layout tab.
    - Distribute contents evenly.
    - Remove any auto-generated containers that are unneeded.
- Balance

    - Distribute contents evenly
- Negative Space
    - Outer padding
    - Inner padding
- Flow
    - Start top left with title
    - Consider the corners
        - Use that little data source line to guide the eye back in.



FOOTHOLDS

Remember that every visualization we make, every dashboard we design, is a code that we're asking our audience to *de*code. Our goal is to give our audience as many footholds into the visualization or dashboard as possible.

BIG PICTURE

- Title
  - Dashboard title
  - Chart titles (we're using the questions the chart answers as our titles)
  - New title for ACT and SAT scores
    - Create a new sheet
    - Institution Name to Detail
    - Unit ID to Detail (note the uptick in marks...why? Yep, some institutions have identical names.)
    - Finally, add State and Region to Detail
    - Edit the title to read: How do test scores compare across regions, states, and institutions? Region: <BEA Regions> | State: <State> | Institution: <Institution Name>
    - Now we just need to get rid of the text. Change the mark type to text and drag the edges of the text up and in until they disappear.
    - Now add your new title to the dashboard. Check it out. Your filters already hit it.

- Keys
  - Our state map is our primary key.
  - We will also add our color key for the green and yellow used in the test scores into our instruction icons next.
- Instructions
  - Change filter, highlighter titles to include a direction
  - Hover, click in tooltips
  - Little Yellow Icons
    - Create a new sheet and name it Icon.
    - Create a new calculated field that just reads "Placeholder". Add that new field to detail.
    - Change the shape to a diamond and use the color to make it yellow.
    - Now click on the tooltip and you can delete the number of records information and create any type of instructions you'd like.
    - Examples: How it works / Our Data / Let's Chat / Notes (for example) this massive jump corresponds to the new test being rolled out.
- Patterns
  - Consistency in functionality
  - Highlight sheet the instructions are about:
    - Add your first icon to the dashboard
    - Now, add a dashboard action
    - Source sheet: Icon
    - Run on: hover
    - Target sheet: everything checked except the scatter plot
    - All fields
    - OK

SAVE YOUR WORKBOOK

The final step is to save your workbook! If you haven't already created a Tableau Public account, return to the Companion Guide website for instructions to make one. Once you've done that, here's how you save your workbook.

- Go to File, Save to Tableau Public As, and then enter your Tableau Public account credentials.
- Name your workbook.
- Edit the workbook details on your Tableau Public page. You can control whether the workbook appears on your profile page and whether someone else can download the workbook and data.
- Note that you should NEVER save anything private on Tableau Public. This is a place to only save work you've done with public data, like we've done here. To save your work locally, you will need Tableau Desktop, which costs approximately $900 annually.

TAKE THE SURVEY

Now that you're all done with the workshop, we'd so appreciate your feedback so that we can continue to improve our workshops for future attendees. Just click here to answer a few quick questions. Thank you!