

# A glance at SAT/ACT participation rates

A exploratory data analysis approach on  
what contributes to high SAT participation rate and how it impacts the score

# Agenda

- Data collection
- Exploratory Data Analysis
- Recommendation
- Additional data that could be helpful

# We gathered SAT and ACT scores by state for year 2017 and 2018

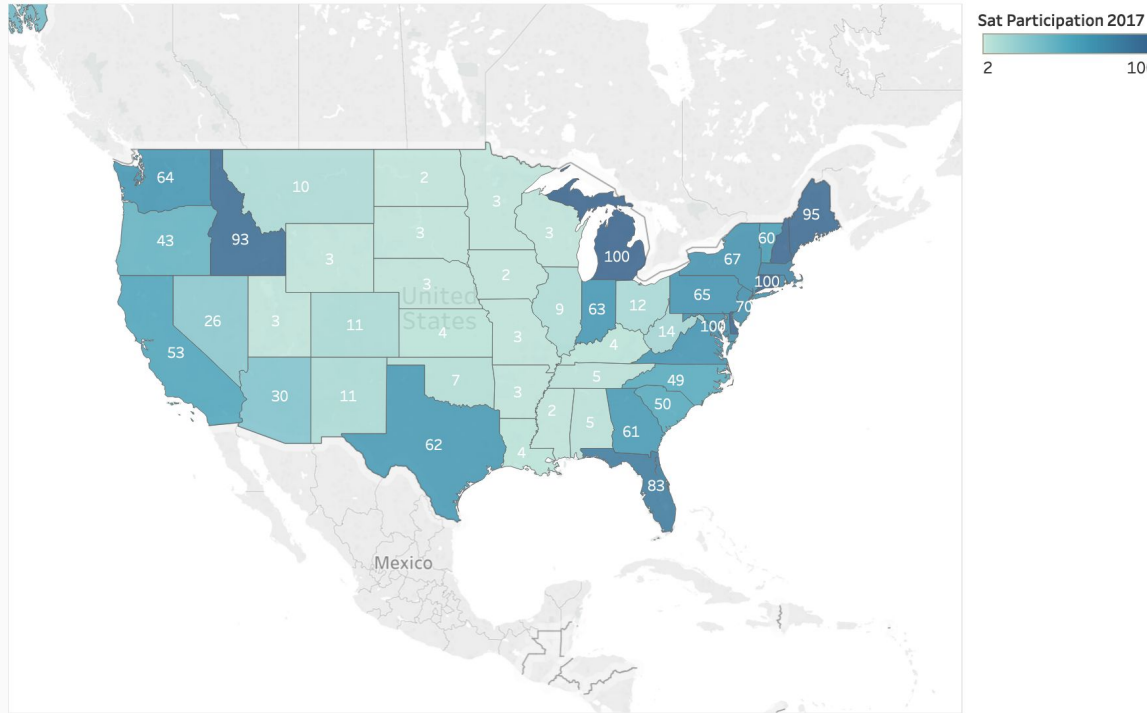
Feature	Type	Dataset	Description
<b>act_state</b>	<i>string</i>	act_2017_new & act_2018_new	Name of the state in the United States
<b>act_participation</b>	<i>float</i>	act_2017_new & act_2018_new	The percent of students taking ACT in the state (units percent to one decimal place)
<b>act_english</b>	<i>float</i>	act_2017_new & act_2018_new	The average score of English subject for students in this state
<b>act_math</b>	<i>float</i>	act_2017_new & act_2018_new	The average score of Math subject for students in this state
<b>act_reading</b>	<i>float</i>	act_2017_new & act_2018_new	The average score of Reading subject for students in this state
<b>act_science</b>	<i>float</i>	act_2017_new & act_2018_new	The average score of Science subject for students in this state
<b>act_composite</b>	<i>float</i>	act_2017_new & act_2018_new	The average score of Composite subject for students in this state

Feature	Type	Dataset	Description
<b>sat_state</b>	<i>string</i>	sat_2017_new & act_2018_new	Name of the state in the United States
<b>sat_participation</b>	<i>float</i>	sat_2017_new & act_2018_new	The percent of students taking SAT in the state (units percent to one decimal place)
<b>sat_ebrw</b>	<i>float</i>	sat_2017_new & act_2018_new	The average score of English subject for students in this state
<b>sat_math</b>	<i>float</i>	sat_2017_new & act_2018_new	The average score of Math subject for students in this state
<b>sat_total</b>	<i>float</i>	sat_2017_new & act_2018_new	The average score of Reading subject for students in this state

# SAT Participation Rates

# SAT dominates the coasts, where private universities are located.

## SAT Participation Rates in 2017



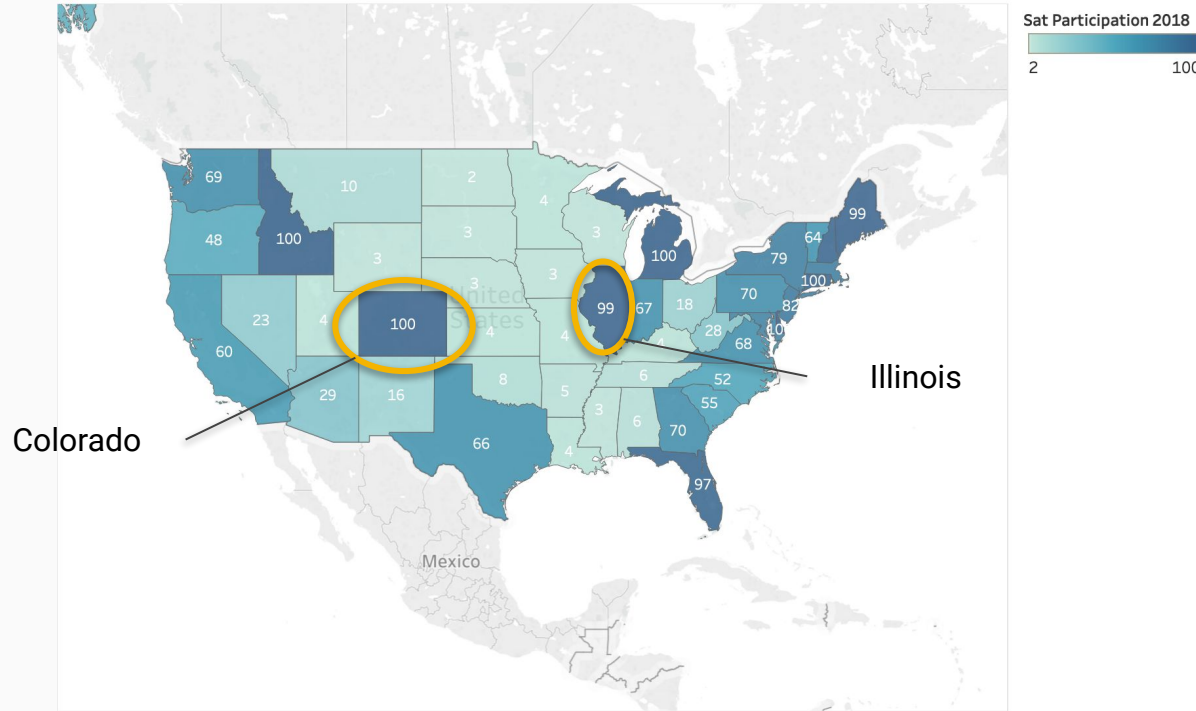
Map based on Longitude (generated) and Latitude (generated). Color shows Sat Participation 2017. The marks are labeled by Sat Participation 2017. Details are shown for State.

States with high SAT participation rates cluster around east and west coasts.

Historically SAT have been more popular in these states, where private school are located, with sAT being a requirement for admission.

# Two states flipped to 100% SAT participation in 2018 due to state mandate

## SAT Participation Rates in 2018

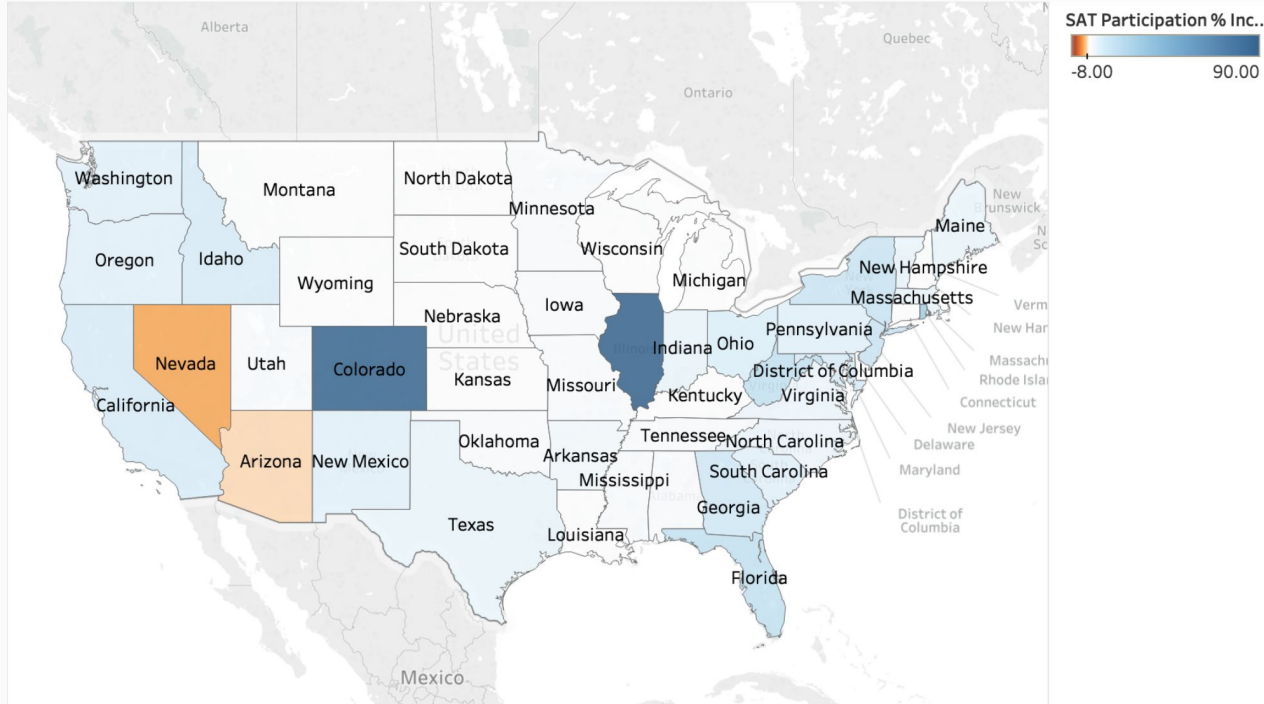


Map based on Longitude (generated) and Latitude (generated). Color shows Sat Participation 2018. The marks are labeled by Sat Participation 2018. Details are shown for State.

Geographical tendency remains the same in 2018, with **Colorado** and **Illinois** flipping from ACT to 100% SAT due to policy change

SAT participation saw increase in majority of the states.

## Increment of SAT Participation Rates in Year 2018 Over Year 2017



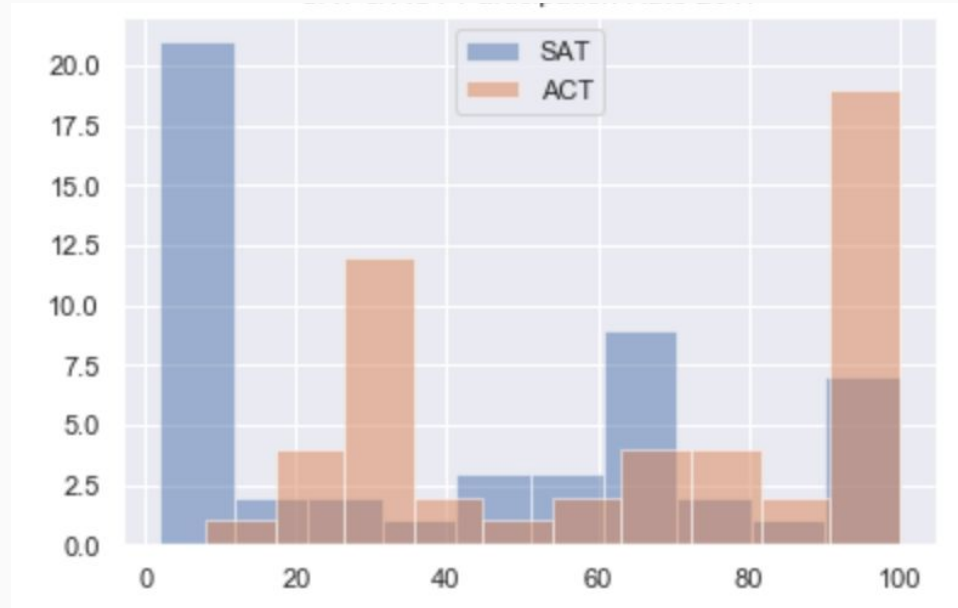
**35** out of the 51 states  
saw increase in SAT  
participation rates.

## SAT School Day program

**3 states (Nevada, Arizona, District of Columbia) had slight decline in SAT participation rates.**

Both ACT and SAT participation rates has been showing great disparity among the states.

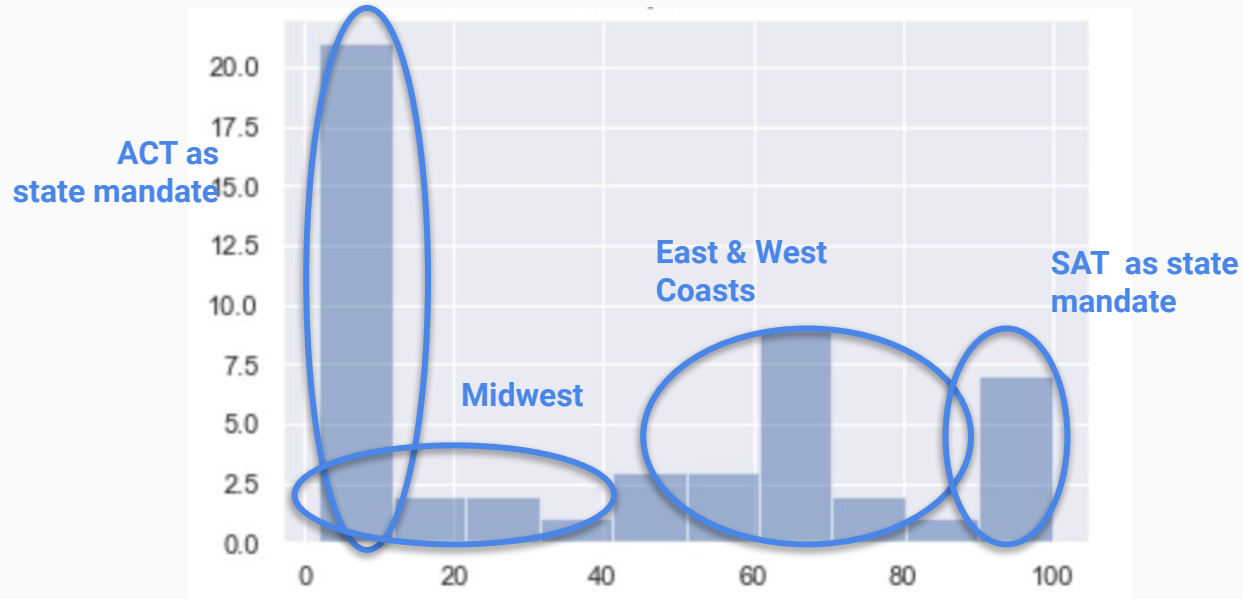
Distribution of SAT/ACT Participation Rates in Year 2017





Disparity of SAT participation rates comes from state mandate and geographical factors, among many other reasons.

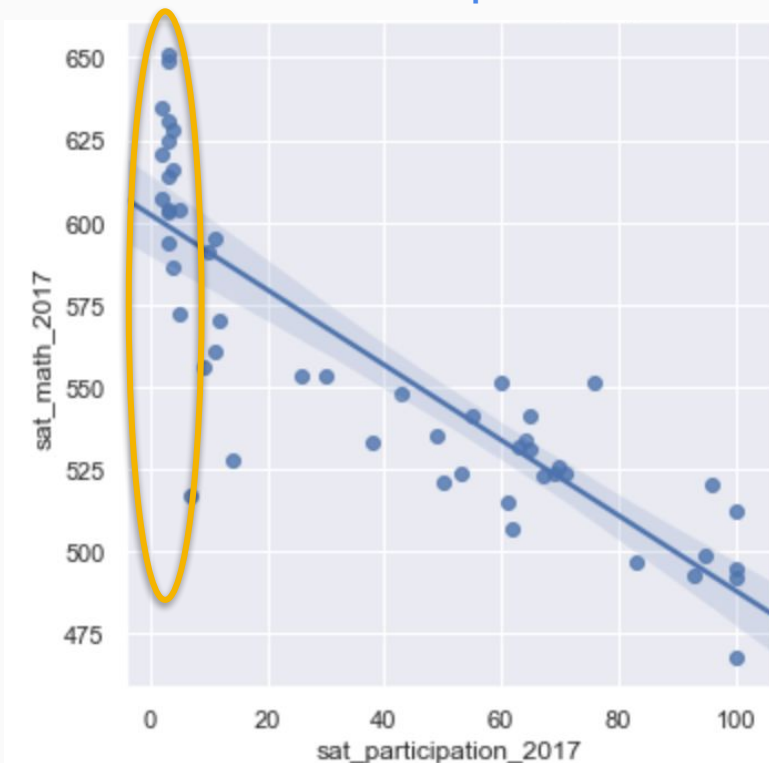
Distribution of SAT/ACT Participation Rates in Year 2017



# SAT Scores

# Inverse relationship between score and participation rate comes from self-select bias

SAT Math Score vs. SAT Participation Rate in 2017

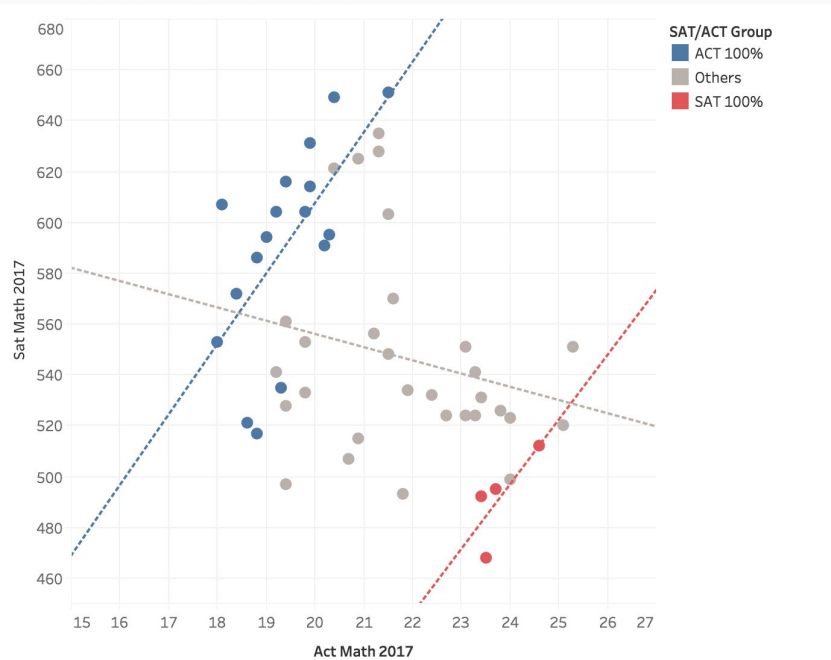


We see **inverse** correlation between score and participation rate. Especially for the states with low (<10%) SAT participation rates, the SAT scores are much higher (in top 50th percentile) than the rest.

In the **midwest**, where ACT dominates, usually only the students who are applying for private universities take SAT. They took the test to boost their portfolio, so it is natural that they'd only take the test as they believe they will do well.

# Statistically, we can't infer the SAT/ACT score correlation due to the different testing populations in the states

## SAT Math Score vs. ACT Math Score in 2017



Act Math 2017 vs. Sat Math 2017. Color shows details about SAT/ACT Group.

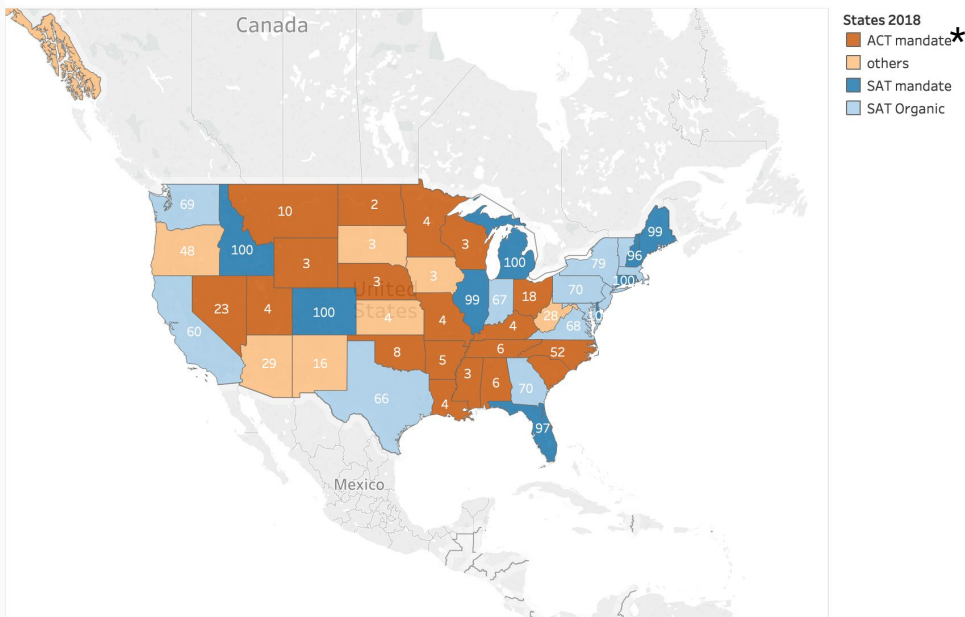
For states with either **SAT/ACT as the standardized test** to fulfill state accountability, we see a **better fit of the linear regression** for the SAT and ACT score correlation. This suggests that SAT and ACT are aligned to certain level in testing students' readiness for college.

For states with **SAT/ACT as a voluntary option**, there is no clear correlation between the SAT and ACT scores. We can't attribute this 'randomness' purely to the differences between the two test formats, as the samples here are heterogeneous\*.

\* Rather, in order to explore the correlation between ACT and SAT scores, a more appropriate way is to apply random sampling to individuals who have taken both ACT and SAT in the US nationwide. This would reflect the correlation on students who decided to take both and stay away from the self-select bias.

# Strategy should be tailored to each state based on its current state requirement and graduating class' desire to use SAT for college admission

States Requiring Students to Take Either SAT or ACT in 2018



\* The labeling for state mandate is made based on research with guess as follows:

ACT mandate: ACT participation  $\geq 95\%$

SAT mandate: SAT participation  $\geq 95\%$

SAT organic: SAT participation in  $[50\%, 95\%)$

Others: the remaining states

## 1. States with organically high SAT participation

Increase test centres to meet demand

Continue/expand SAT School Day program

## 2. States with ACT mandate

In the short term, target at schools with students likely to apply for private universities with promotion programs (e.g. SAT School Day, free SAT).

In the long run, state-level strategy policy to win over SAT contract

## 3. States without ACT mandate yet having low SAT participation rates

Work even harder with state government to reinstate the importance of college admission test, followed by actions in points 2 and 1.

# Next steps

## What data

Size of graduating class in each state

Categorization of the states by the state policy, e.g. is college entrance test compulsory, which one, is it free etc.

Accessibility to SAT test centres

Income level (adjusted by cost-of-living of the state)

## For what

Prioritize action items towards the states with large size of graduating class.

Enable fairer evaluation of the correlation between ACT and SAT scores.

Test hypothesis that states with less SAT test centres or inaccessible test centre locations tend to have low participation rates

Test hypothesis that states with high income level may tend to take both tests or repeated tests (and if this has an impact on the scores)

Thank you!

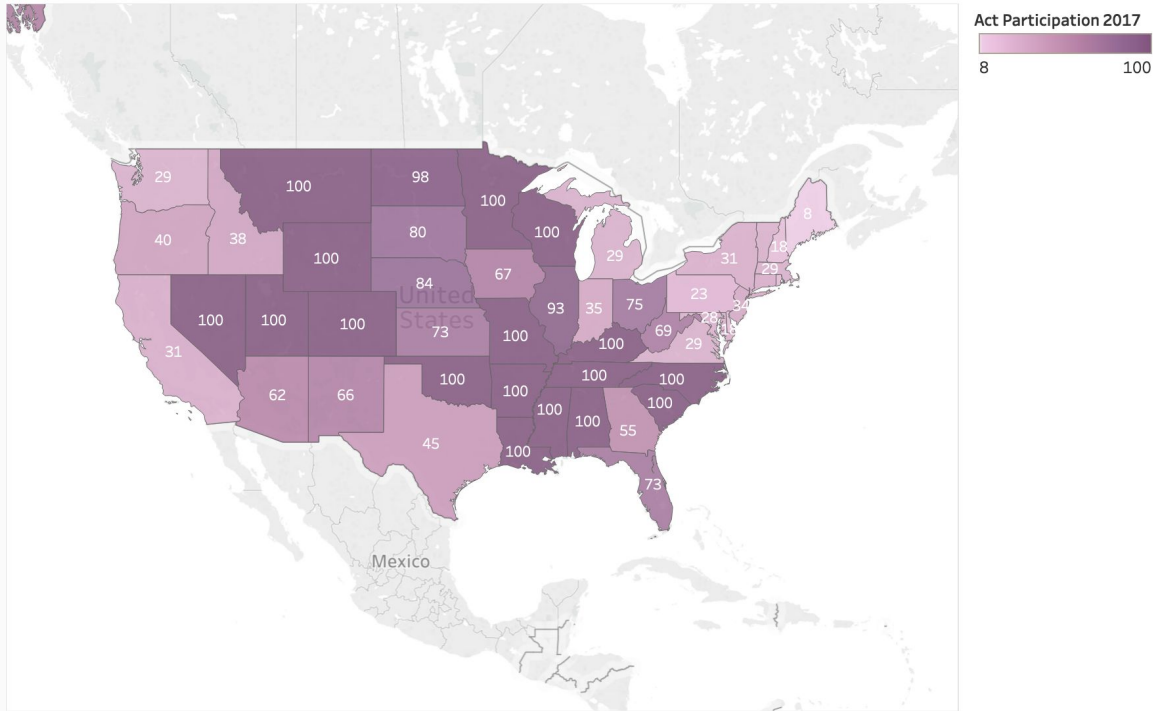
# Caveat

It is not fair to compare year-over-year results because:

- 1) the SAT has seen significant changes in its testing population;
- 2) SAT revised test format in 2016 and the population is still on the way getting accustomed to the content.



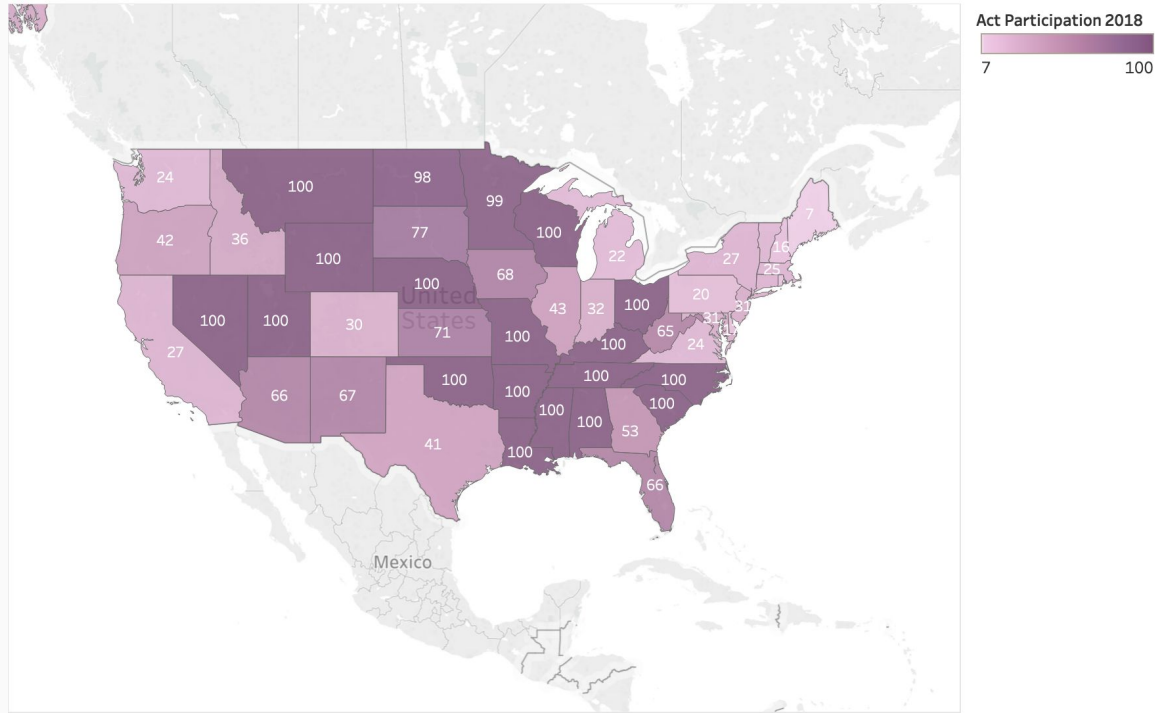
## ACT Participation Rates 2017



Map based on Longitude (generated) and Latitude (generated). Color shows Act Participation 2017. The marks are labeled by Act Participation 2017. Details are shown for State.

States with high ACT participation rates cluster around mid-west region.

## ACT Participation Rates 2018



Map based on Longitude (generated) and Latitude (generated). Color shows Act Participation 2018. The marks are labeled by Act Participation 2018. Details are shown for State.

One state (Ohio)  
shows relatively  
higher increase in  
ACT participation