Increasing SAT Participation Rates in the US

General Assembly DSI 22

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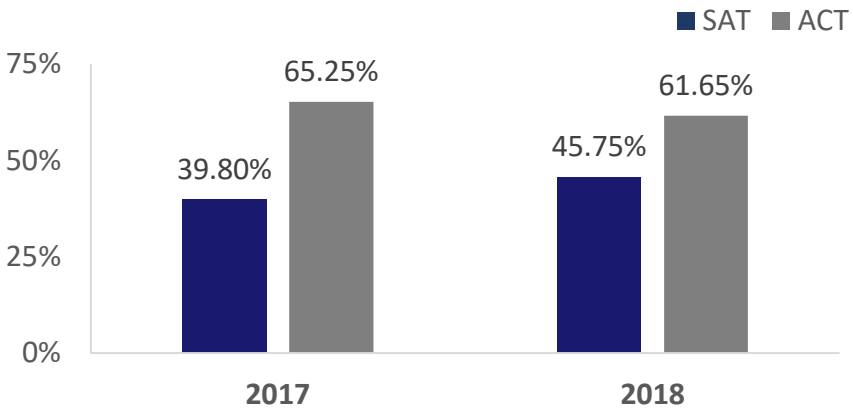
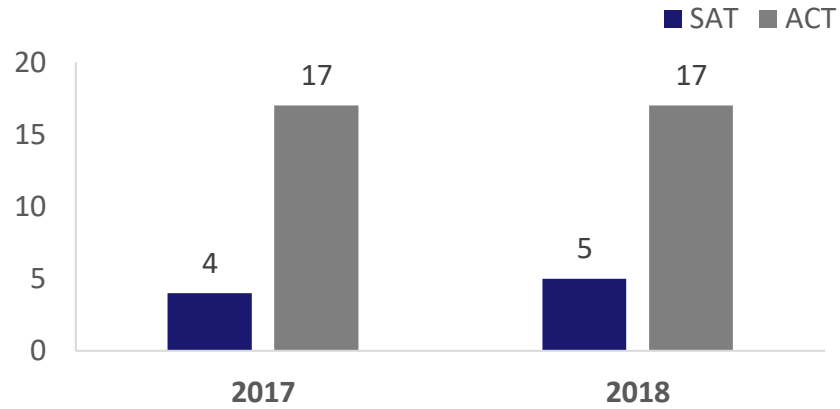
Overview

We see a larger mean participation rate for the ACT across the states and also a higher proportion of states with 100% participation rate for ACT. Students tend to score better for the SAT as compared to the ACT.

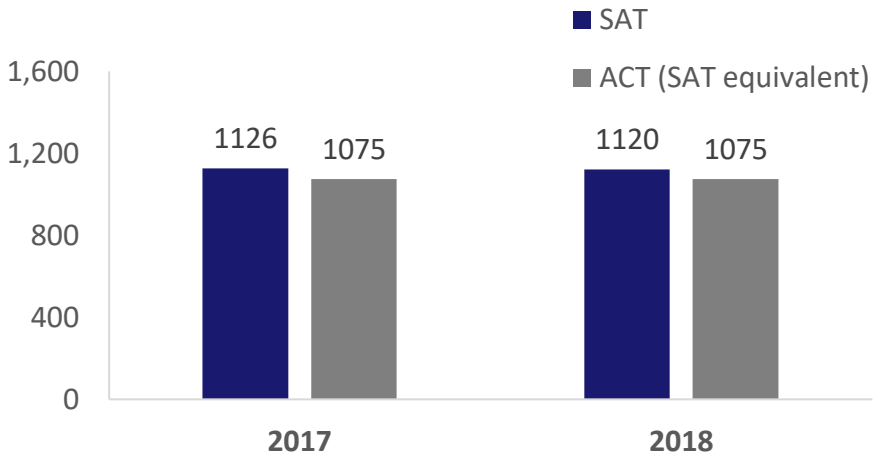
Average Participation



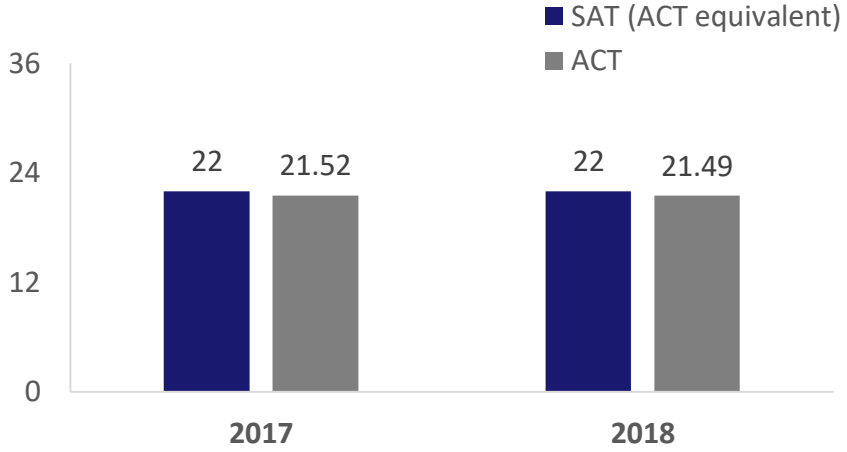
Number of States with 100% Participation



Average Score (scaled to SAT)



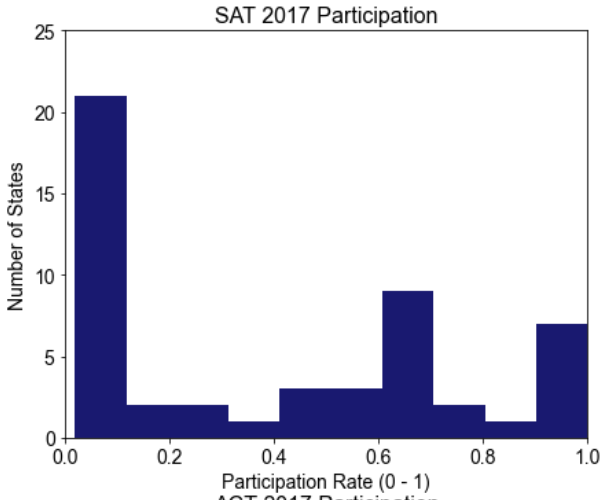
Average Score (scaled to ACT)

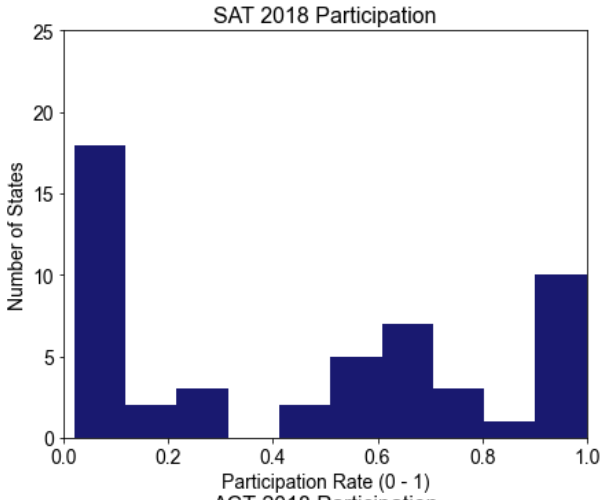


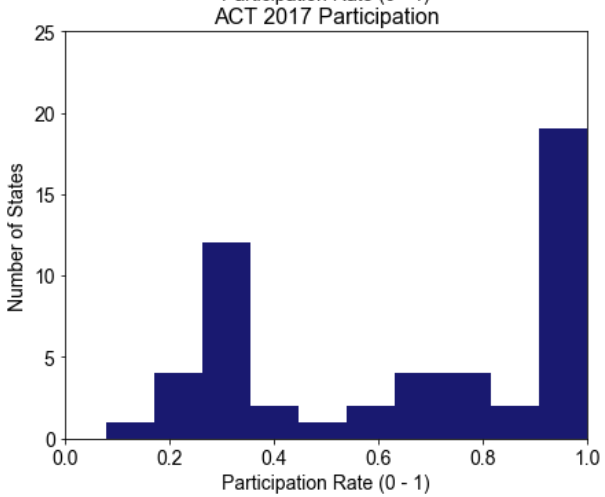
Source: Collegevine, ACT Inc., Princeton Review
Note: Rebasing and conversion for SAT and AT scores done using https://www.princetonreview.com/college-advice/act-to-sat-conversion

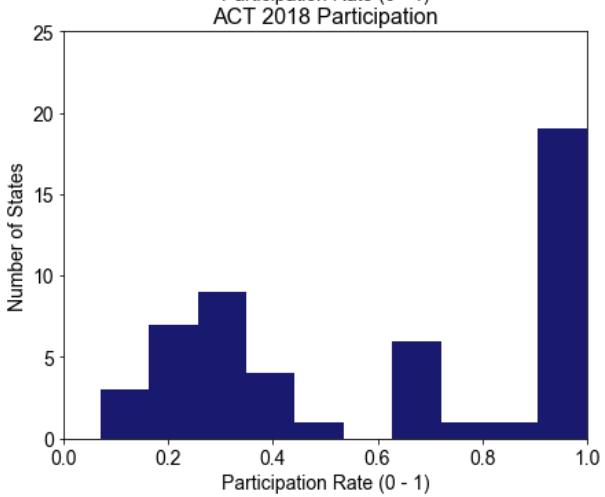
Breakdown of Participation by State

We look at the further breakdown of test participation across states to tease out where we are trailing.







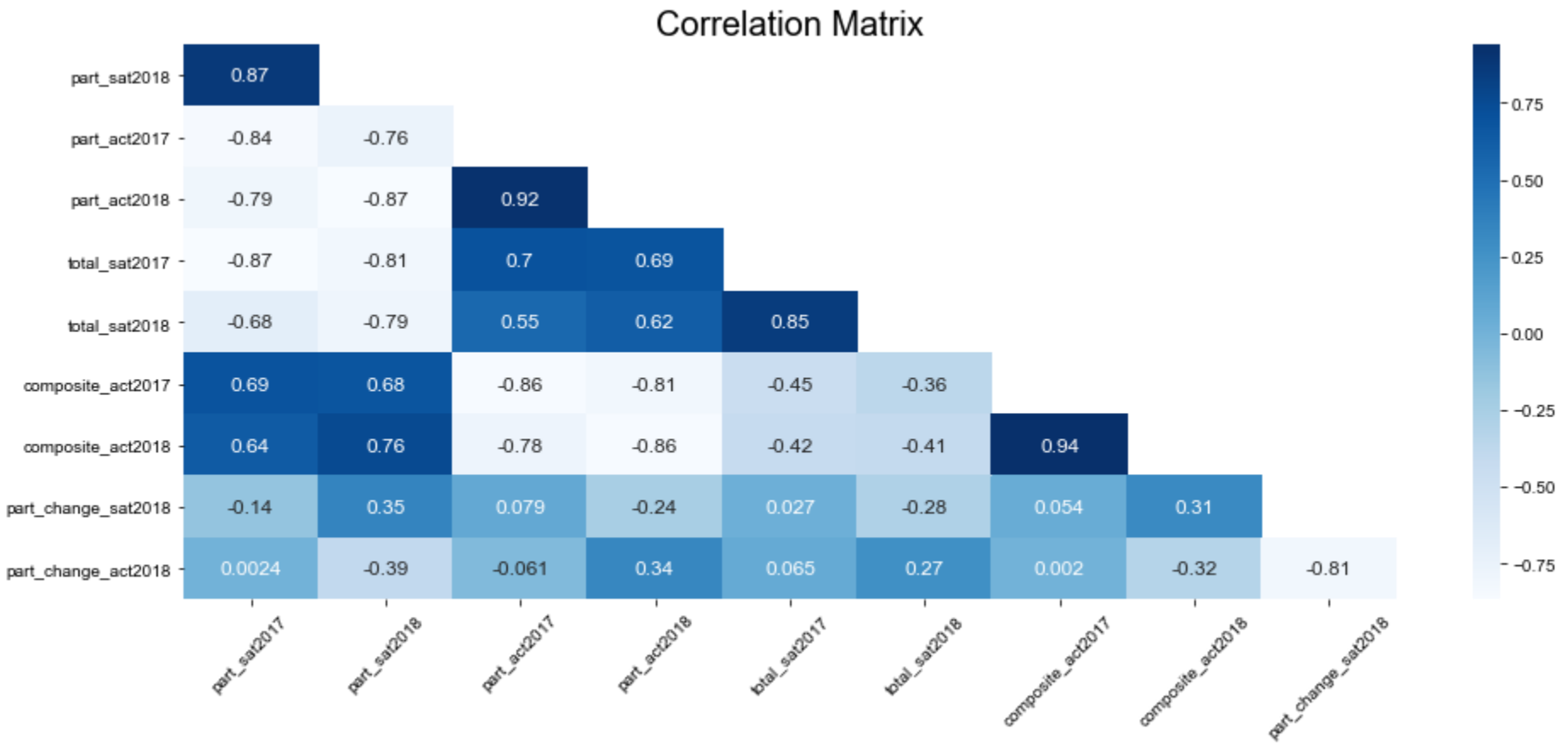


- In the 2017 SATs, we saw a large proportion of states with 10% or less participation and a low proportion of states with 90% or more participation.
- This changed slightly in 2018 with less states with less than 10% participation and more with 90% or more participation.
- However, when compared with the ACT across both years, the ACT saw little to no states with less than 10% participation and significantly more states with 90% or more participation.
- This is the result of many states having contracts with ACT Inc to provide free ACT testing to some or all high school juniors at public schools.

Source: Peterson's

Correlation within the Data

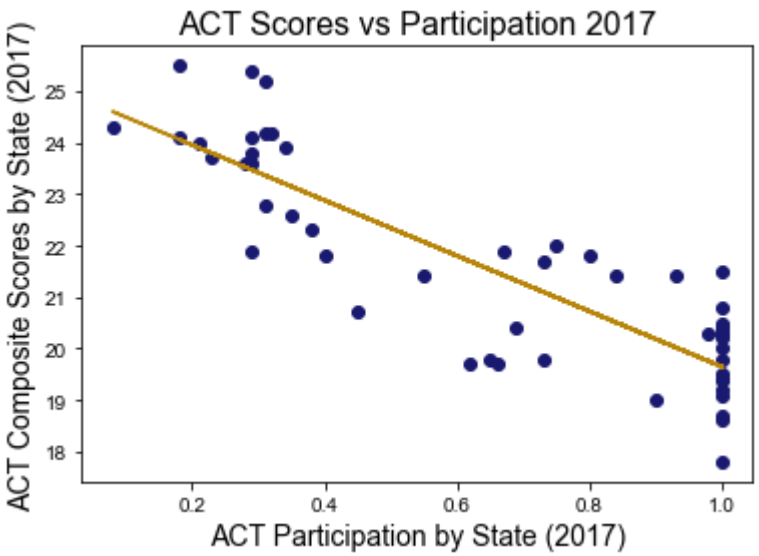
We look at the correlation between participation and scoring for SAT and ACT across 2017 and 2018

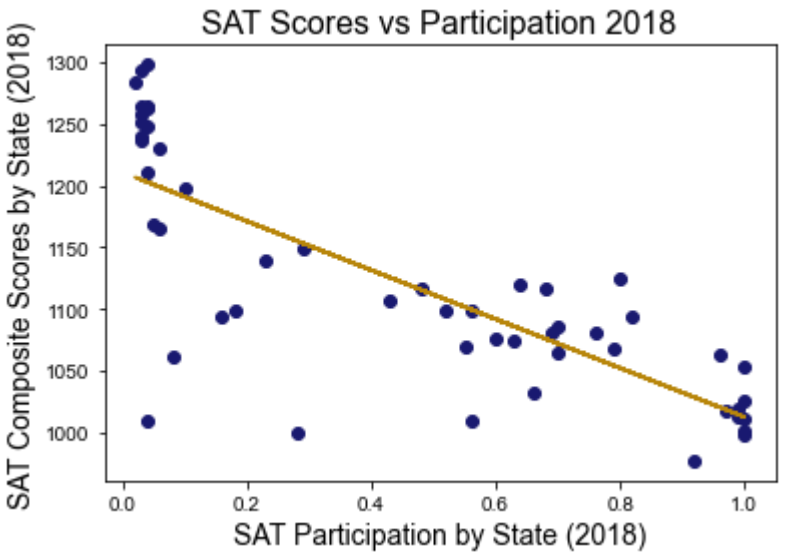


- High positive correlation between participation rate for same test over the 2 years for the same state.
- High negative correlation between participation rate and score.
- High negative correlation between the participation rate for one test to the other in the same year.

Source: Collegevine, ACT Inc.

Diving Deeper into Participation Rates and Scores





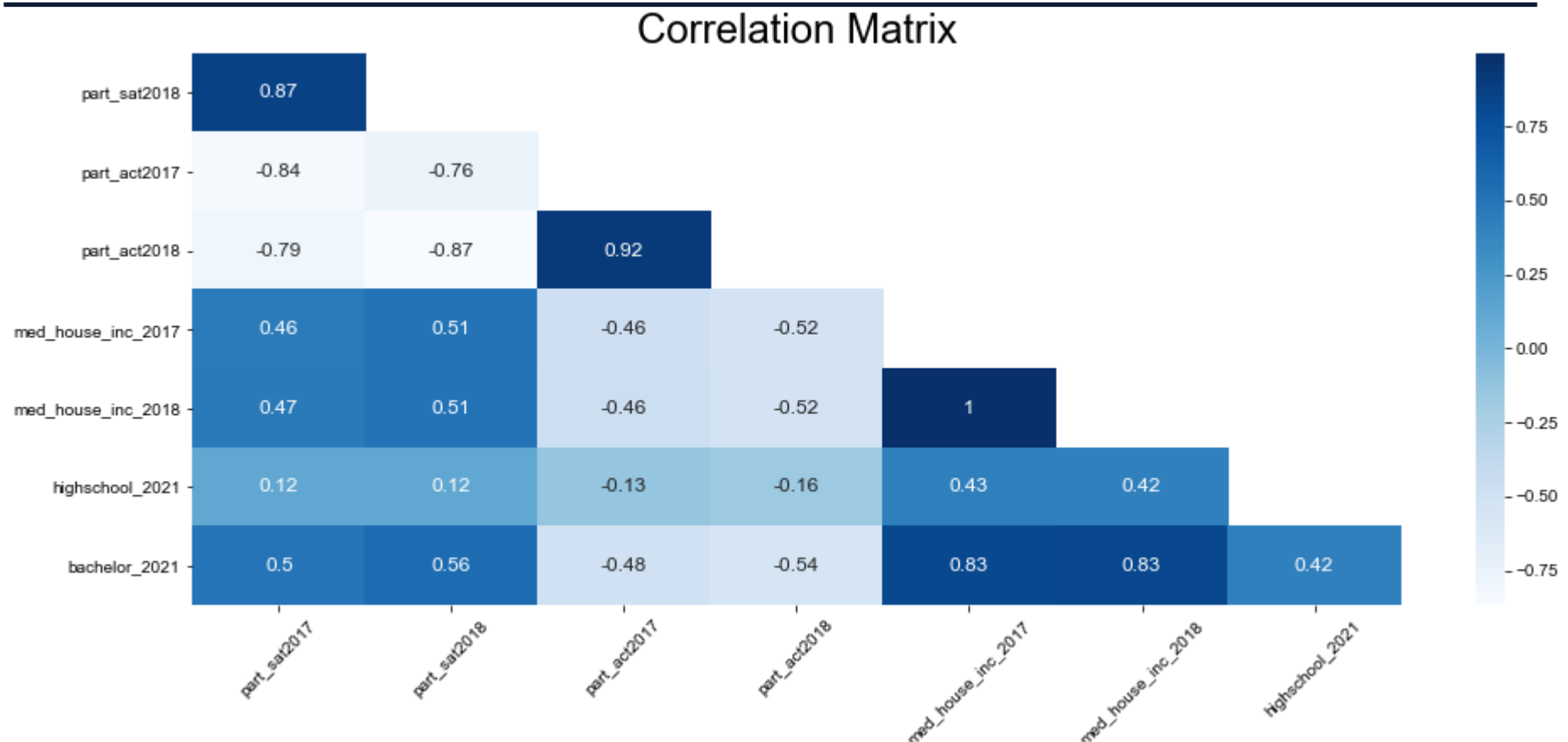
- In addition to the negative correlation between scores and participation (-0.87 for SAT 2017, -0.79 for SAT 2018, -0.86 for ACT 2017 and 2018), the plots above display the same relationship.

- In essence, the more students participate in a test, the lower the average scores are. This is the case for 2 reasons:
  - With more students, there is a larger pool and the average score will be lower than a select group of more driven students. In states where the ACT or SAT is mandatory, this is inevitable.
  - Conversely, in states with low participation in either test, the students that opt to take the less popular tests are probably ones who are taking both. These students naturally have a stronger emphasis on making it to the college of their choice and these tests are important to them thereby resulting in a higher score.

- It is important for us to take note of the sampling bias when we unpack the data we have.

Source: Collegevine, ACT Inc.

Participation Rates vs Median Household Income and Educational Attainment



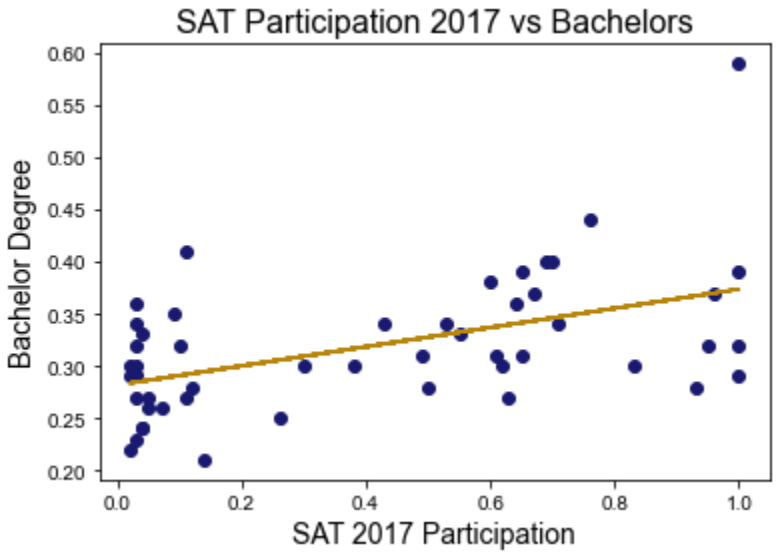
- We see a moderately strong positive correlation between median household income and participation in SATs. The converse is true for ACTs where median household income is negatively correlated to participation. This is probably due to the ability for these families to afford expensive test prep services for their children.

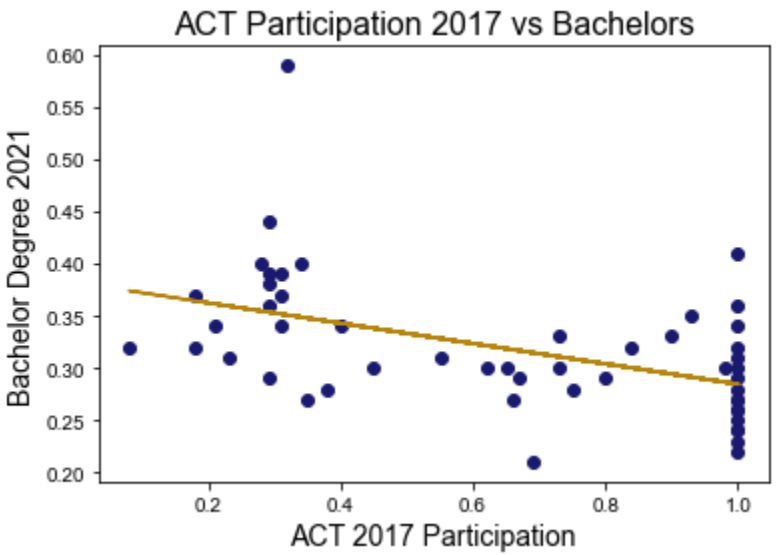
- High positive correlation between SAT participation and percentage of Bachelor Degree holders in the particular state and a negative correlation between ACT participation and percentage of Bachelor Degree holders..

- It is more likely for an affluent state to choose to take the SAT and the SAT has been shown to produce a higher rate of college admission. The states that have a higher participation in the SATs have a higher proportion of degree holders.

Source: Collegevine, ACT Inc., US Census Bureau

Participation Rates vs Educational Attainment



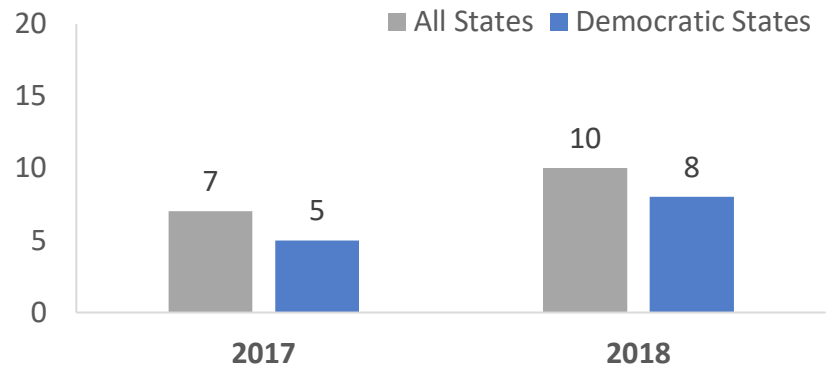


- In the 2 scatter plots above, we compare SAT and ACT participation with the proportion of degree holders in the state.
- We use the 2017 participation rates and the 2021 numbers for educational attainment for the state. This is done with a 4 year gap being the average time for a student to graduate from college after admission.
- We can see a moderately strong positive correlation between SAT participation and proportion of Bachelor Degree holders in a particular state. There is also a moderately strong negative correlation between ACT participation and proportion of degree holders in the state.
- It might not be the case that taking the SATs guarantee a higher chance of attaining a Bachelor's degree but it is certainly the case that a more educated state opts for the SATs over the ACTs.

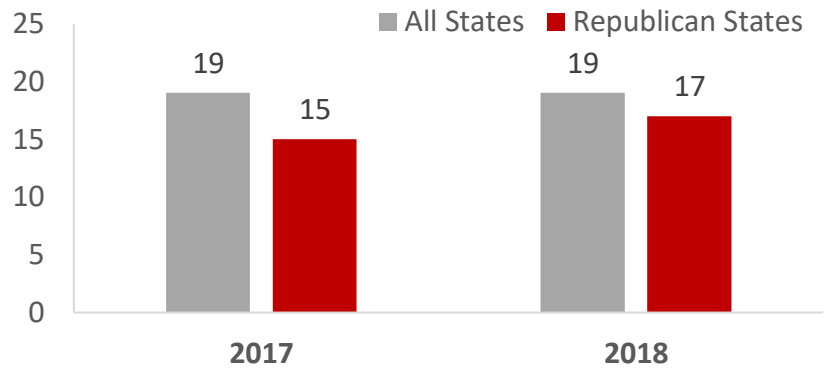
Source: Collegevine, ACT Inc., US Census Bureau

Case Study: Democratic and Republican States

States with >90% Participation in SAT



States with >90% Participation in ACT



- We assume that states with more than 90% participation rate in either test mandate their students (to a reasonable degree) to take that particular test.
- When we look at the SATs, we see a trend of a high proportion of democratic states that make up this sub-group. When looking at the ACTs, the majority of states now shift to republican states.
- There might be some inherent differences in the policy formation and thinking between these 2 camps and these might be a contributing factor as to whether or not the state chooses the SAT or ACT as the test of their choice.

Source: Collegevine, ACT Inc., New York Times

Case Study: Colorado

- Colorado switched from using the ACT to the SAT as the state's mandatory test of choice. Several other states have recently made the decision to use the SAT instead of the ACT, including Connecticut, Michigan, Hawaii, Oregon, South Carolina and Illinois.

- Given that the cost of the SAT and ACT do not vary widely, there are other factors that must have come into play for this decision. One oof the reasons speculated was that there are more resources available online for SAT preparation as compared to the ACT.

- Colorado has also partnered with Khan Academy to provide free, presonalised test prep for students with computer access, saving students and families at least $300 and levelling the playing field for families that might not be able to afford test prep or tutors for their children.

Recommendations

- The best way for us to increase participation in the SAT is to have it be the mandatory test of choice for a particular state. Education should be one of the top priorities for any state and most states will be able to afford funding for the test. This should also be an easy decision for states to make as there is a strong positive correlation between median household income and the proportion of bachelor degree holders in a particular state.

- This then begs the question - which states should we target? We first remove all states that have more than 90% participation in the SATs. We then should narrow down to democratic states and also states with a relatively higher median household income.

- Democratic states that do not have a high rate of participation include **Nevada** (currently using the ACT) and **also New Mexico.**

- **Wisconsin** and **Wyoming** are also the 2 states that have relatively high median household income of 90, 773 and 61, 584 respectively.

- When doing so and attempting to convince the state to take on the SAT, we should first see what additional resources we can provide to support the students in the state (Khan Academy being one such example). It is also important to provide the statistics such as the proportion of Bachelor Degree holders in states that choose to administer the SAT and also the positive benefit of a higher household median income.

Appendix

Summary Statistics of Data

Please refer to next appendix slide for further details on each variable

	count	mean	std	min	25%	50%	75%	max
part_act2017	51.0	0.652549	0.321408	0.08	0.310	0.69	1.000	1.00
english_act2017	51.0	20.931373	2.353677	16.30	19.000	20.70	23.300	25.50
math_act2017	51.0	21.182353	1.981989	18.00	19.400	20.90	23.100	25.30
reading_act2017	51.0	22.013725	2.067271	18.10	20.450	21.80	24.150	26.00
science_act2017	51.0	21.450980	1.739353	18.20	19.950	21.30	23.200	24.90
composite_act2017	51.0	21.519608	2.020695	17.80	19.800	21.40	23.600	25.50
part_sat2017	51.0	0.398039	0.352766	0.02	0.040	0.38	0.660	1.00
read_n_write_sat2017	51.0	569.117647	45.666901	482.00	533.500	559.00	613.000	644.00
math_sat2017	51.0	556.882353	47.121395	468.00	523.500	548.00	599.000	651.00
total_sat2017	51.0	1126.098039	92.494812	950.00	1055.500	1107.00	1212.000	1295.00
part_act2018	51.0	0.616471	0.340810	0.07	0.285	0.66	1.000	1.00
english_act2018	51.0	20.988235	2.446356	16.60	19.100	20.20	23.700	26.00
math_act2018	51.0	21.125490	2.035765	17.80	19.400	20.70	23.150	25.20
reading_act2018	51.0	22.015686	2.167245	18.00	20.450	21.60	24.100	26.10
science_act2018	51.0	21.345098	1.870114	17.90	19.850	21.10	23.050	24.90
composite_act2018	51.0	21.486275	2.106278	17.70	19.950	21.30	23.550	25.60
part_sat2018	51.0	0.457451	0.373143	0.02	0.045	0.52	0.775	1.00
read_n_write_sat2018	51.0	563.686275	47.502627	480.00	534.500	552.00	610.500	643.00
math_sat2018	51.0	556.235294	47.772623	480.00	522.500	544.00	593.500	655.00
total_sat2018	51.0	1120.019608	94.155083	977.00	1057.500	1098.00	1204.000	1298.00
part_change_act2018	51.0	-0.036078	0.134478	-0.70	-0.040	-0.01	0.000	0.25
part_change_sat2018	51.0	0.059412	0.182717	-0.27	0.000	0.01	0.050	0.90
diff_act	51.0	-0.033333	0.724063	-1.70	-0.300	-0.10	0.100	3.10
diff_sat	51.0	-6.078431	50.674587	-228.00	-2.500	6.00	16.500	82.00

Summary Statistics of Data (data dictionary)

Feature	Type	Dataset	Description
state	object	ACT 2017	*State*
part_act2017	float	ACT 2017	*Participation for the state for 2017 ACT (scaled from 0 - 1*
english_act2017	float	ACT 2017	*Average score for state for English component for 2017 ACT*
math_act2017	float	ACT 2017	*Average score for state for Math component for 2017 ACT*
reading_act2017	float	ACT 2017	*Average score for state for Reading component for 2017 ACT*
science_act2017	float	ACT 2017	*Average score for state for Science component for 2017 ACT*
composite_act2017	float	ACT 2017	*Average composite score for state for 2017 ACT*
state	object	SAT 2017	*State*
part_sat2017	float	SAT 2017	*Participation for the state for 2017 SAT (scaled from 0 - 1*
read_n_write_sat2017	int	SAT 2017	*Average Evidence-based Reading and Writing score for state for 2017 SAT*
math_sat2017	int	SAT 2017	*Average Math score for state for 2017 SAT*
total_sat2017	int	SAT 2017	*Average Total score for state for 2017 SAT*
state	object	ACT 2018	*State*
part_act2018	float	ACT 2018	*Participation for the state for 2018 ACT (scaled from 0 - 1*
english_act2018	float	ACT 2018	*Average score for state for English component for 2018 ACT*
math_act2018	float	ACT 2018	*Average score for state for Math component for 2018 ACT*
reading_act2018	float	ACT 2018	*Average score for state for Reading component for 2018 ACT*
science_act2018	float	ACT 2018	*Average score for state for Science component for 2018 ACT*
composite_act2018	float	ACT 2018	*Average composite score for state for 2018 ACT*
state	object	SAT 2018	*State*
part_sat2018	float	SAT 2018	*Participation for the state for 2018 SAT (scaled from 0 - 1*
read_n_write_sat2018	int	SAT 2018	*Average Evidence-based Reading and Writing score for state for 2018 SAT*
math_sat2018	int	SAT 2018	*Average Math score for state for 2018 SAT*
total_sat2018	int	SAT 2018	*Average Total score for state for 2018 SAT*
part_change_sat2018	float	SAT 2017, SAT 2018	*Change in participation for a particular state from 2017 SAT to 2018 SAT*
part_change_act2018	float	ACT 2017, ACT 2018	*Change in participation for a particular state from 2017 SAT to 2018 ACT*
diff_act2018	float	ACT 2017, ACT 2018	*Change in composite score for a particular state from 2017 ACT to 2018 ACT*
diff_sat2018	int	SAT 2017, SAT 2018	*Change in total score for a particular state from 2017 SAT to 2018 SAT*
is_republican	int	NY Times	*1 if state is majority republican for 2016 presidential elecitons, 0 if democratic*
med_house_ince_2017	int	US Census Bureau	*Median household income for a particular state for 2017*
med_house_ince_2018	int	US Census Bureau	*Median household income for a particular state for 2018*
highschool_2021	float	US Census Bureau	*Proportion of state that graduated high school (range from 0 to 1)*
bachelor_2021	float	US Census Bureau	*Proportion of state that are Bachelor's degree holders (range from 0 to 1)*