Analysis of SAT Compulsory Requirement with Its Scores as High School Graduation Criteria

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Standardised Test in United States
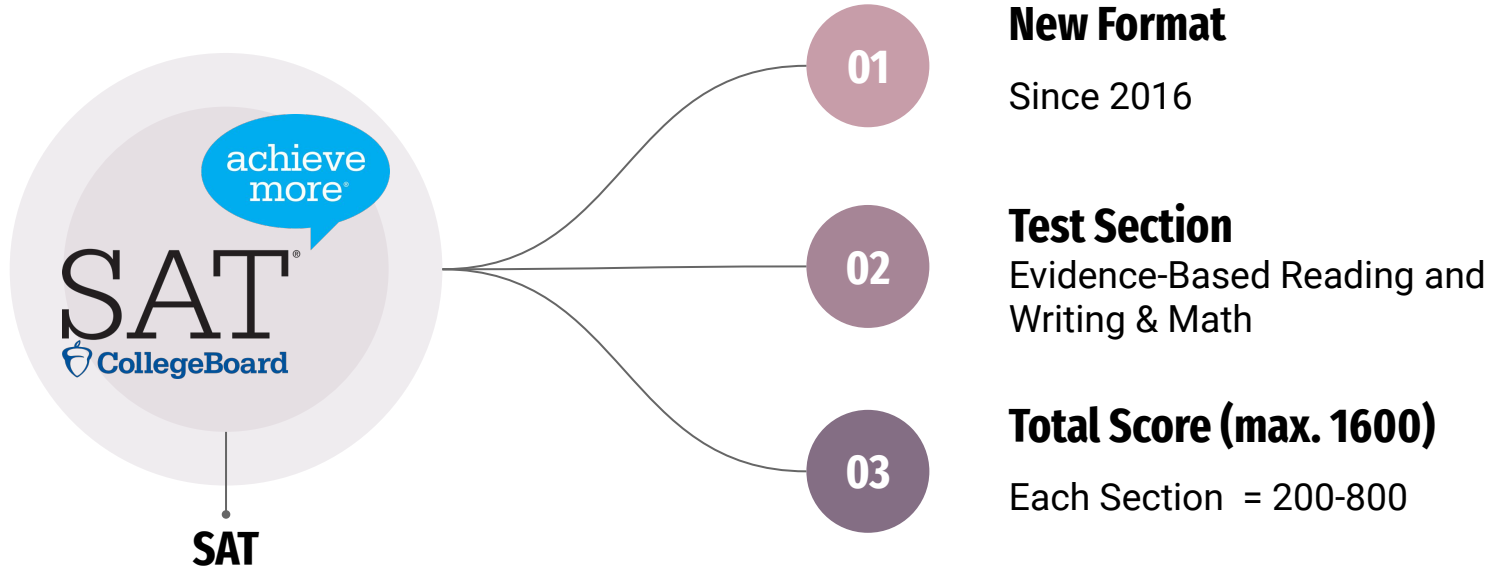

SAT

Scholastic Aptitude Test

ACT

American College Test

Standardised Test in United States

SAT
achieve more
CollegeBoard

SAT

Scholastic Aptitude Test

01 New Format
Since 2016

02 Test Section
Evidence-Based Reading and Writing & Math

03 Total Score (max. 1600)
Each Section = 200-800

State Requirement

Compulsory		
Colorado	Connecticut	Delaware
Idaho	Illinois	Maine
Michigan	New Hampshire	Rhode Island
West Virginia		

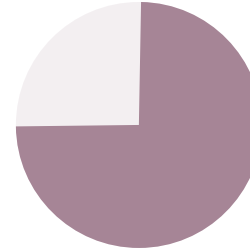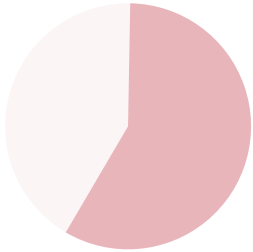| Free & Optional	
District of Columbia	Oklahoma
South Carolina	Tennessee
Ohio	

Survey Statistic

59%

U.S Teens

Plan to attend 4-year college

16% - Plan to attend other form higher ed studies
22% - Unsure

Junior High School

Believes SAT/ACT affect university admission

75%

Statistic

In 2020, Colorado

Estimated spent more than

$ 1,485,000

on SAT expenditure

Sources:
-https://www.opencampusmedia.org/2020/10/02/why-colorado-students-are-still-taking-the-sat-even-though-its-now-voluntary/
-https://www.thoughtco.com/sat-costs-fees-and-waivers-4121675

Problem Statement:
To analyse if compulsory SAT as a requirement is needed for state legislative to implement

Datasets Used

sat_2017.csv	2017 SAT Scores by State
sat_2018.csv	2018 SAT Scores by State
sat_2019.csv	2019 SAT Scores by State

Cleaning Dataset

- Found some error on the data from sat_2017.csv where the Math section score is below the minimum. We used the total score minus Evidence-Based Reading and Writing score to obtain the correct data.

- Added three new columns:
    - total_mean -> to obtain the average of the mean total score for three consecutive year (2017-2019) by individual state
    - participation_mean -> to obtain the average of the participation rate for three consecutive year (2017-2019) by individual state
    - state_requirement -> to classify which state has the requirement on the SAT exam

Data Dictionary (1-2)

Feature	Type	Dataset	Description
state	*object*	sat_2017_to_2019.csv	The state where the high school graduate who take SAT test
participation_2017	*float*	sat_2017_to_2019.csv	The percentage of the high school graduate who took the SAT test in 2017
evidence_based_read_and _write_2017	*integer*	sat_2017_to_2019.csv	Average Evidence-Based Reading & Writing section test score (200-800) of high school graduates by states in 2017
math_2017	*integer*	sat_2017_to_2019.csv	Average Math section test score (200-800) of high school graduates by states in 2017
total_2017	*integer*	sat_2017_to_2019.csv	Average Total test score (max. 1600) of high school graduates by states in 2017
participation_2018	*float*	sat_2017_to_2019.csv	The percentage of the high school graduate who took the SAT test in 2018
evidence_based_read_and _write_2018	*integer*	sat_2017_to_2019.csv	Average Evidence-Based Reading & Writing section test score (200-800) of high school graduates by states in 2018
math_2018	*integer*	sat_2017_to_2019.csv	Average Math section test score (200-800) of high school graduates by states in 2018

Data Dictionary (2-2)

Feature	Type	Dataset	Description
total_2018	*integer*	sat_2017_to_2019.csv	Average Total test score (max. 1600) of high school graduates by states in 2018
participation_2019	*float*	sat_2017_to_2019.csv	The percentage of the high school graduate who took the SAT test in 2019
evidence_based_read_and _write_2019	*integer*	sat_2017_to_2019.csv	Average Evidence-Based Reading & Writing section test score (200-800) of high school graduates by states in 2019
math_2019	*integer*	sat_2017_to_2019.csv	Average Math section test score (200-800) of high school graduates by states in 2019
total_2019	*integer*	sat_2017_to_2019.csv	Average Total test score (max. 1600) of high school graduates by states in 2019
total_mean	*float*	sat_2017_to_2019.csv	Average of the mean total score from 2017 to 2019 by states
participation_mean	*float*	sat_2017_to_2019.csv	Average of the participation rate from 2017 to 2019 by states
state_requirement	*object*	sat_2017_to_2019.csv	The requirement of SAT at each state (compulsory, free & optional, NA)

Observations

- First, we sort the dataset based on participation rate in 2017
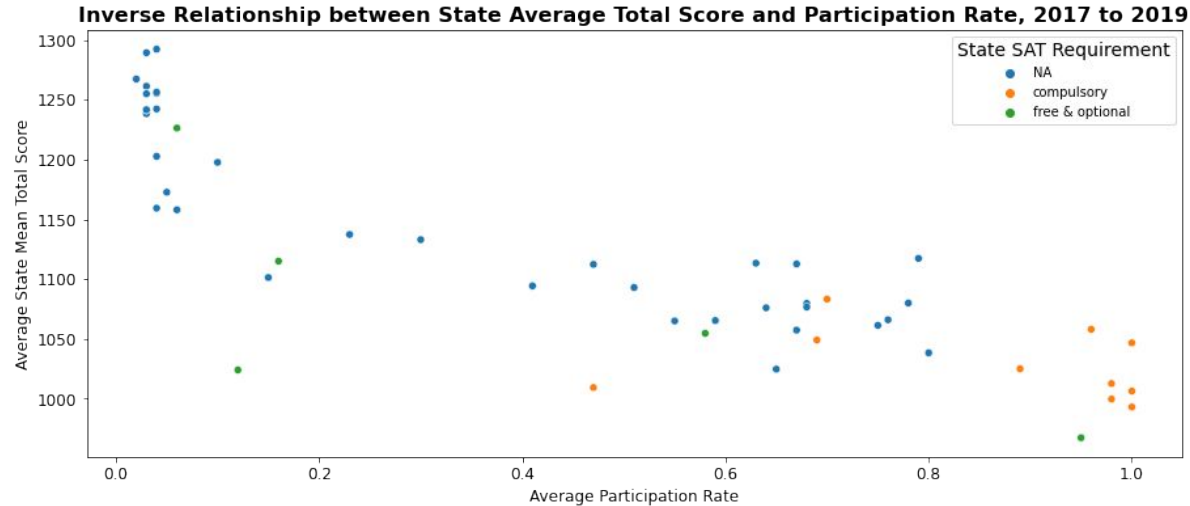
Top 10 highest participation rate

state	participation_2017	evidence_based_read_and_write_2017	math_2017	total_2017
District of Columbia	1.00	482	468	950
Michigan	1.00	509	495	1005
Connecticut	1.00	530	512	1041
Delaware	1.00	503	492	996
New Hampshire	0.96	532	520	1052
Maine	0.95	513	499	1012
Idaho	0.93	513	493	1005
Florida	0.83	520	497	1017
Massachusetts	0.76	555	551	1107
Rhode Island	0.71	539	524	1062

Top 10 lowest participation rate

| state	participation_2017	evidence_based_read_and_write_2017	math_2017	total_2017
North Dakota	0.02	635	621	1256
Mississippi	0.02	634	607	1242
Iowa	0.02	641	635	1275
Missouri	0.03	640	631	1271
Utah	0.03	624	614	1238
South Dakota	0.03	612	603	1216
Nebraska	0.03	629	625	1253
Wisconsin	0.03	642	649	1291
Minnesota	0.03	644	651	1295
Wyoming	0.03	626	604	1230

Observations

- We found the same pattern in 2018 and 2019 data as well. Thus, we used the average participation and average state mean total score to plot a graph as below:

Inverse Relationship between State Average Total Score and Participation Rate, 2017 to 2019

Observation 1: The higher the participation rate, the lower the mean total score is
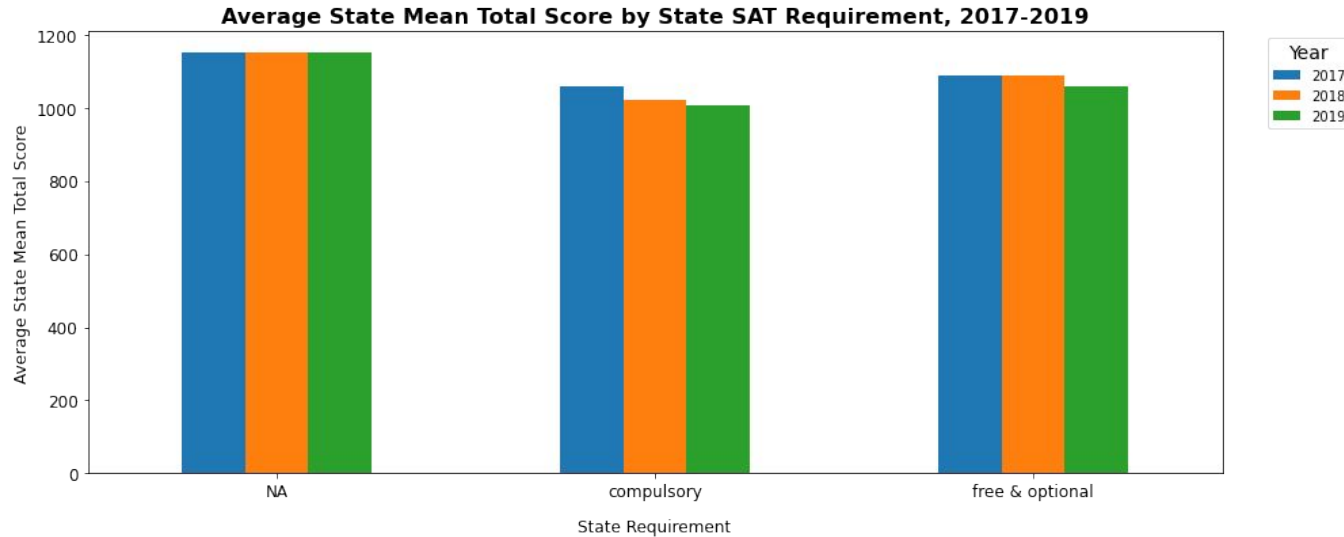
Observations

- Next, the dataset is group by the state requirement categories: compulsory, free & optional and NA and a bar chart is plot
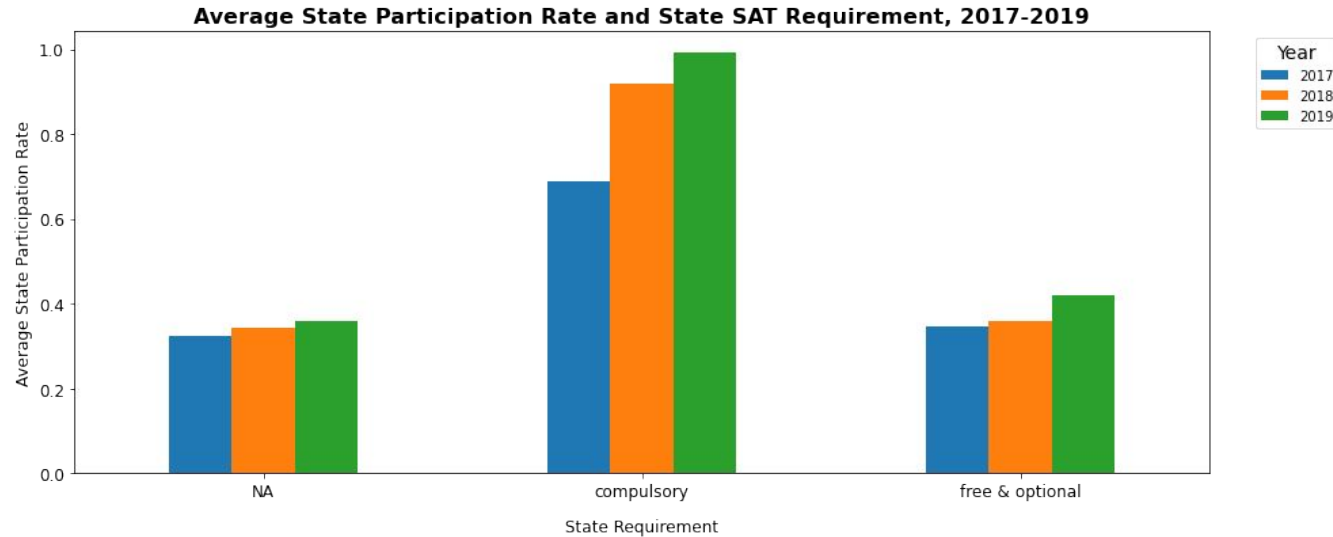
Observation 2: The participation rate for every categories generally increase throughout the years
(NA < 50%, free & optional < 50%, compulsory > 70%)

Observations

- Next, the dataset is group by the state requirement categories: compulsory, free & optional and NA and a bar chart is plot

Observation 3: The mean total score is stagnant/decrease slightly throughout the years

Observations

- Next, the dataset is group by the state requirement categories: compulsory, free & optional and NA and a bar chart is plot
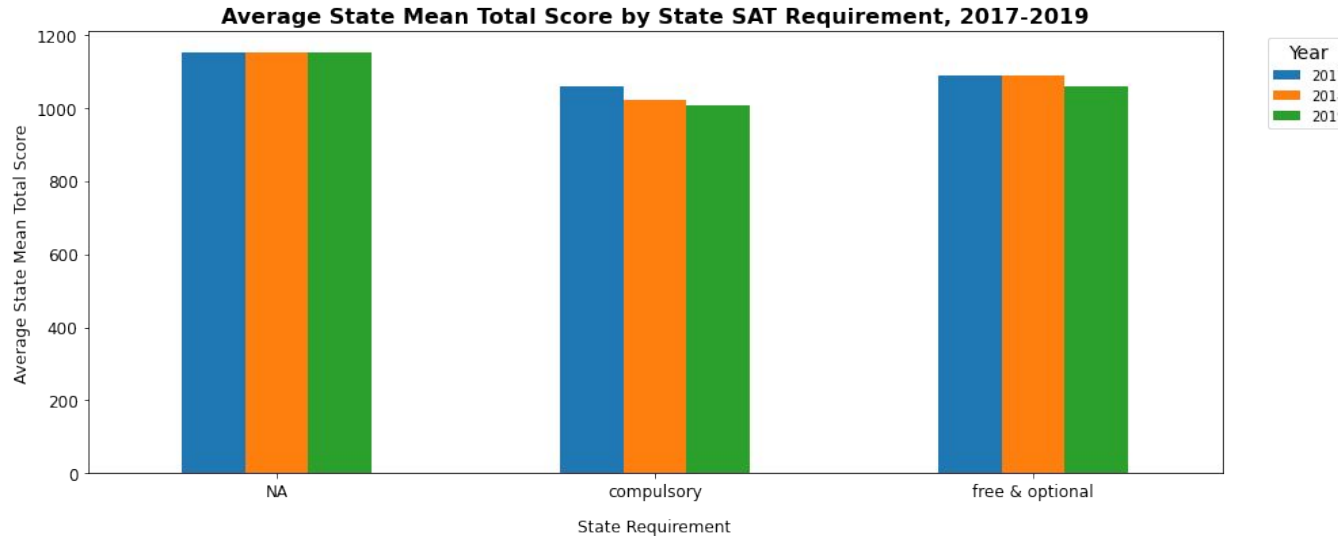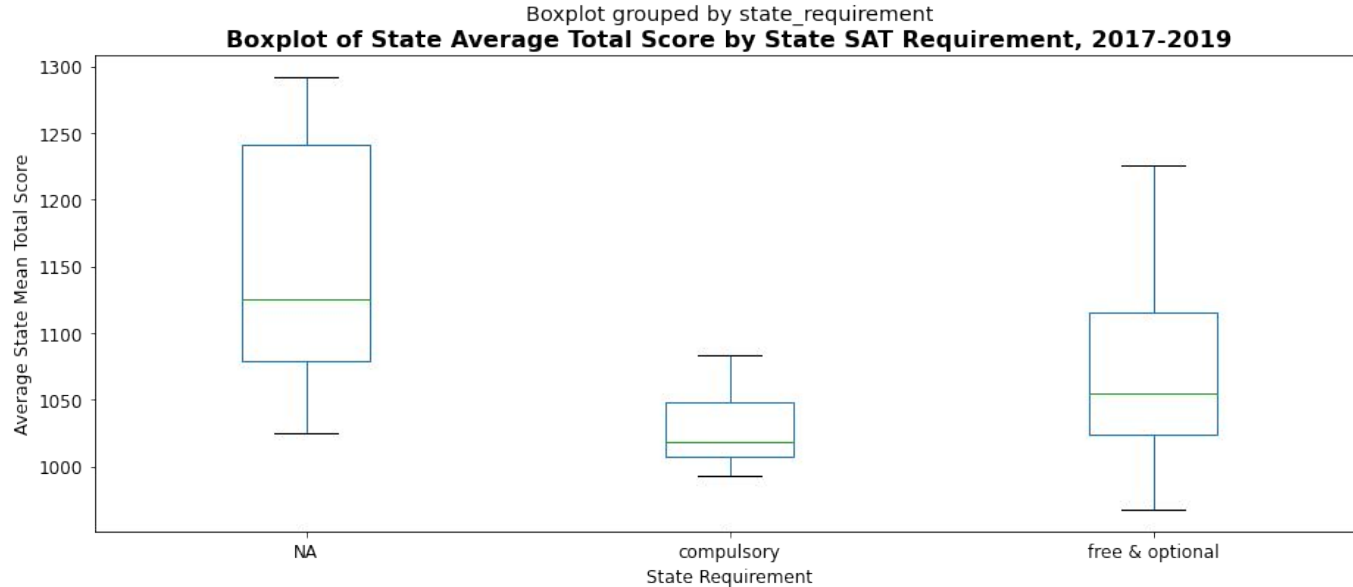

Observation 4: The mean total score for state with compulsory SAT requirement is the lowest = 1028.3
(4.5% lower than free & optional [1077.5], 10% lower than no requirement [1150.9])

Observations

Boxplot grouped by state_requirement
Boxplot of State Average Total Score by State SAT Requirement, 2017-2019

Observation 5: compulsory average mean total score tend to be more stable than
the other 2 categories but still within the lower percentile
The median of the compulsory is the lowest as well among others

Conclusion:

- Based on our findings above, we can imply that the state with the compulsory SAT requirement has no clear advantage over the one that offers free & optional SAT or none. This may be due to the students' choice over the higher education that they wanted to attend since SAT is required only for most of the universities. Thus, those students does not prepare for the SAT
- As for the other states without any compulsory SAT requirement, the students voluntarily apply for the test itself, as a result they will be more prepared to score higher for their university admission. This can also be found in the relationship between SAT scores and participation rate above.

Recommendation:

- To provide free & optional SAT test instead of compulsory SAT. This will allow the students to have choice on what they want to pursue.
- To provide better preparations for the student who choose to go for SAT so they will not have to take multiple attempts in order to save time.
- The remaining budget for the compulsory SAT can be allocated for other types of test that is more suited for the trade school or higher education study.
- To provide consultation/survey for students to get better idea of what is their plan or to advise them if they are doubtful

Thank You