Government Spending and SAT Scores

Ryan Dong (rfd83), Nicolas Vera (nmv28), Jacqueline Viola (jlv78)

Data description

Sources

We obtained the SAT score data from two sources:

- http://mathforum.org/~pdaley/datalibrary/data.set6.html
- http://nces.ed.gov/programs/digest/d10/tables/dt10_154.asp

The state education spending information was obtained from:

- http://www.usgovernmentspending.com/compare_state_spending_1990b20a
- http://www.usgovernmentspending.com/compare_state_spending_2012b20a

Variables

Our main variable is the difference in SAT composite scores between the years 1990 and 2012 for each state in the United States, as well as the difference in education spending for each state.

We created new variables in the dataset, one of them being the state codes. We created a composite score variable for each year, which sums the average math and reading section scores to obtain an average composite score. We also created a variable representing the difference in composite SAT scores between the years 1990 and 2012 for each state. The last variable created was the difference in education spending for each state from the years 1990 and 2012, adjusted for inflation according to http://www.bls.gov/data/inflation_calculator.htm.

The government spending for education by state is represented as the difference in spending on education per capita. The spending data that we used is state and local spending on education, rather than just state spending, because we want the total amount spent on education for each state.

Choosing the subset

The SAT College Board dataset presented information about the average math and reading section scores for each state, for each year between 1990 and 2012. It also provided data about the percent of students in each state that participated in the SAT exam for each year. To tell our story, we did not find it necessary to include the participation data in our visualization (% of students who participated in the exam each year); it would just be extraneous detail and wouldn't provide any more insight. We thus chose to use the score data.

We also had SAT score data for the years 1990 to 2013, but we chose to omit the data from 2013. We found the year 2013 to be an outlier: our map showed that Idaho, although moving on an upward trend in composite scores, had a worse composite score in 2013 than in 1990.

This showed a negative difference in scores for Idaho, and we felt that it was a misrepresentation of Idaho's SAT score trend.

Dataset integration

We essentially have two datasets: SAT scores and government spending for education. We did not integrate both sets on a single map. For consistency, we are concentrating on the differences in scores and government spending on education between the first and last years in our datasets (1990 and 2012). The essential information from both datasets was integrated into a single CSV file named "sat-data.csv".

Mapping to visual elements

Maps and colors

The data is projected onto a map of the United States. We chose to use the albersUsa projection, a familiar image of the US. The difference in SAT composite scores are mapped linearly to a color scale. We chose to use white to represent low increases in average composite score and dark blue-grey to draw attention to those states with the most improved scores. For the difference in government spending on education per capita, we represented low increases with a very light green, and greater increases with dark greyish-green. We found that there was a large enough difference in numbers for the contrast between shades of green to appear nicely, which is why we used light green as the minimum instead of white.

Scales

For the SAT composite difference map, we chose to use a linear blue color scale that makes a connection with the College Board colors. The color of the link for the SAT data is also presented in that blue color. For the government spending on education map, we chose to use a linear green color scale to make the connection with the color of money. The color of the link for the government spending data is presented in this color, as well.

The SAT composite difference by state was scaled from the smallest change in SAT composite scores to the largest. We did not scale the numbers down to 0, fearing that it may misrepresent the data and show the viewer that for those states, there was no change in SAT composite scores.

The story

Origin

We wanted to explore the relationship between state and local spending on education and SAT scores in the United States. Our initial hypothesis was that more spending on education would correlate to higher SAT scores. In the context of our maps, we were looking are the difference in SAT scores versus the difference in government spending on education. In these terms, we thought that a greater difference in spending would correlate to a greater difference in SAT scores.

Results

We found that there is no correlation between education spending and SAT scores, which is surprising and shows that our hypothesis was incorrect. Why is this? The increase in SAT scores may be attributed to students getting smarter as the years go by, better teaching, teaching geared towards taking the SAT, or even easier exams. But why hasn't the increased spending in education resulted in higher standardized test performance? This is may be an error in our data collection and analysis. We did not examine where the education budget is going exactly. For example, is it going to higher salaries for teachers, better school lunches, or subsidized textbooks and materials? This shows that, in order to conclude the relationship between government spending and education, there is further analysis to be done. The government education spending data must be further broken down to analyze where in the education system the money is going. Additionally, different methods of measuring education levels must be considered. It is not enough to just consider one exam to represent the education system as a whole.

Something interesting to note is that, while Maine spent quite a bit more on education in 2012 than in 1990, the difference in SAT scores did not increase much. In contrast, Delaware, which did not have a large difference in education spending, also did not have a large increase in SAT scores.