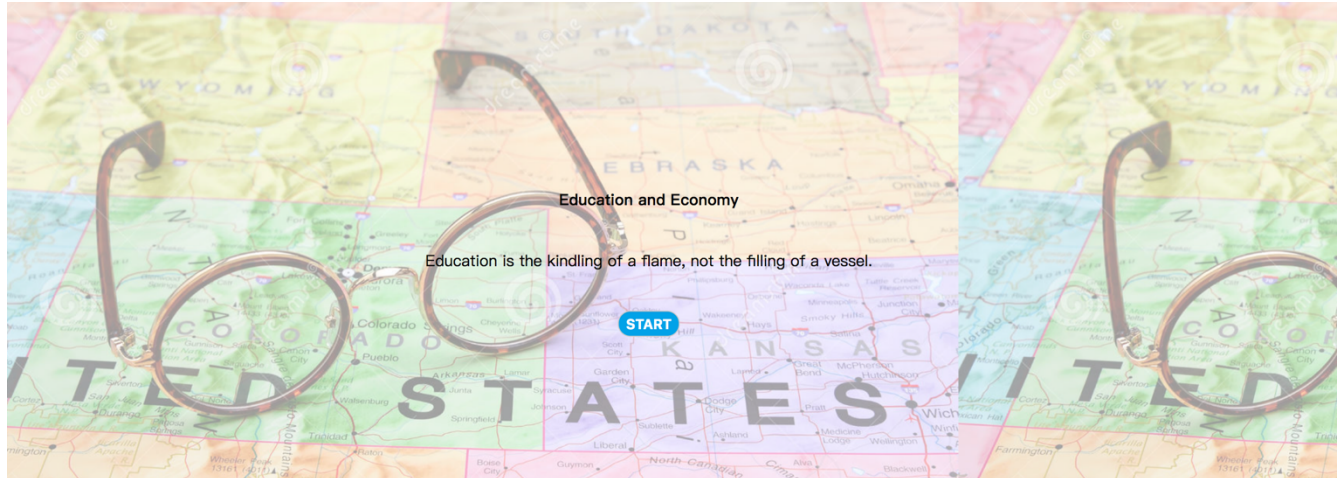


Relationship between Economy and Education in U.S.

Wenhao Huang
Zhiyi Huang



Abstract: In recent decades, education has always been a major focus of social concern in the whole world. People paid more and more attention on it. We focus on a specific aspect of education that relationship between education and economy. Economy is another important part of our daily life, and it is closely related to everyone. In this paper, we used several visualization interactivity approaches, organized and analysis the data we collected on Kaggle in order to find out whether economy will affect education level. The education level in most of states has climbing tendency. However, the revenue which is a part of economy does not affect education much.

Index Terms: Visualization, education, economy, high-stakes tests

1. Introduction:

Education is as important as oxygen to all the people because education gives people the knowledge and skills they require. Education is important to people of all ages and it has no limit. Education provides us with knowledge about the world. It paves the way for a good career. It helps build

character. It leads to enlightenment and lays the foundation of a stronger nation.

Education makes a man complete. All of these illustrate how important education.

Thus, what may influence education is also important.

Based on the raw data we found, we try to find the relations between school outcomes

and state economic development level¹, and the changes among all the states within 25 years.

We drew a Choropleth map with multiple views and slope charts in different times, which can show tendency of education level and economy development from 1993 to 2016.

1.1 Choropleth map

A choropleth map is a thematic map in which areas are shaded or patterned in proportion to the measurement of the statistical variable being displayed on the map, such as population density or per-capita income. Choropleth maps provide an easy way to visualize how a measurement varies across a geographic area or show the level of variability within a region.

In our project, we used choropleth method [Figure 1] which shows the revenue and expenditure in different states in order to highlight the states have higher statistical data. We also add a pie chart to represent the distribution of revenue or expenditure, which can find share of education in total expenditure. The pivot also shows variation in different years. We also add a pie chart

which represents categories and their proportions of revenue and expenditure.

Revenue has three categories and expenditure has four categories.

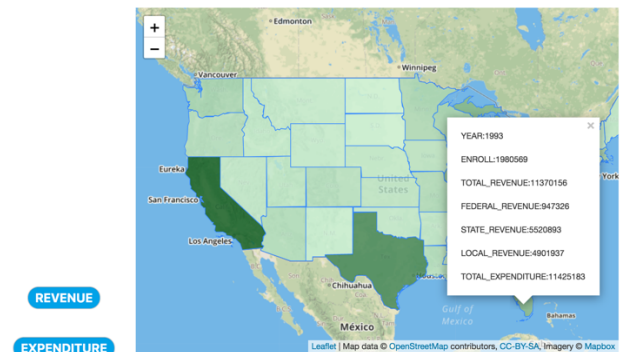


Figure 1: Choropleth map with color channel

In the full visualization, coastal and great lakes regions have deeper color which means these regions have higher revenue and expenditure. We added an extra zoom button, with which we can make interaction easier. And ratio of each categories in revenue and expenditure in different states are similar. The more revenue a state has, the more it will expend on education.

1.2 Slope Graph

A slope graph can be used to show a 'before and after' story of different values, based on comparing their values at different points in time. The related values are connected by slopes.

¹ Larry V. Hedges, Richard D. Laine and Rob Greenwald, Does Money Matter? A Meta-Analysis of Studies of the Effects of Differential School Inputs on Student Outcomes, Educational researcher, April 1994.

Look at the ranking order of the values on the left to get a sense of the gaps and the clusters. Then observe the connecting lines between the related values. Which have gone up, down or stayed the same?

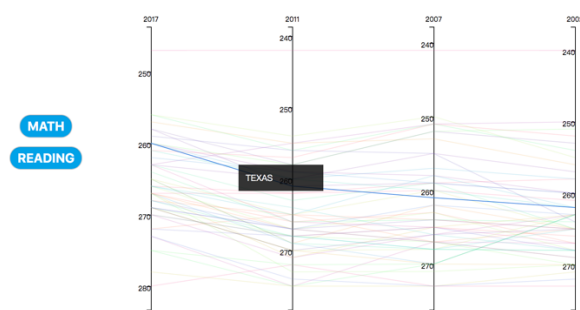


Figure 2: Slope Graph with color channel

We used slope chart to represent the academic record in all the states. In this chart[Figure 2] , we used grade 8 math and reading score as an evaluation of education level and divided 25 years into 4 different times according to the president at that time. In the math plot, it is obviously that most of the states have upward trend. The result of the Slope Chart is consistent with the conclusion of previous paper², states with high-stakes tests, (Alaska , Arizona , Arkansas , Connecticut , Hawaii etc) seem to have outperformed states without high-stakes tests, (Alabama , California , Delaware , Florida etc) on the grade 8 math NAEP at a statistically significant level.

However, gains between states with and without high stakes tests were not statistically different on the grade 8 reading or the grade 8 math NAEP. States with high-stakes tests are not outperforming states without high-stakes tests on both of these measures.

1.3 Ring bubble chart

We designed two rings made up with 20 bubbles which are top 20 states in education and economy aspect. The inner ring shows the top 20 grade 8 math states and the outer shows the top 20 economy states. The two results are almost inconsistent, easy to find in the position.

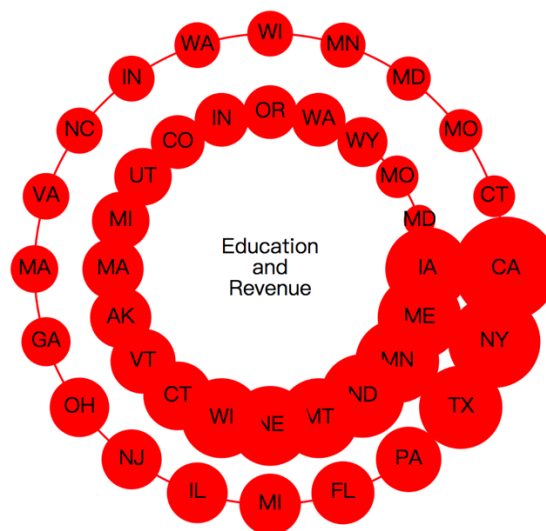


Figure 3: Ring bubble chart

² Audrey Amrein-Beardsley David C. Berliner, Re-analysis of NAEP Math and Reading Scores in States with and without High-stakes Tests: Response to Rosenshine, education policy analysis archives, 2003

According to USNews analysis³, our result of the math grade is basically consistent with NAEP math scores ranking, and for the other five measures, from Pre-K Quality to the college performance, nothing connected with the economy ranking.

2. Conclusion:

We find that in the whole development perspective, the performance of education develops with the rise of economic. However, specific to each state, there is no inevitable link between educational achievement and state economic. In our opinion, the educational achievement is more related to state education policies, such as high-stakes tests policy⁴ and educational emphasis, such as pre-school education.

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³.<https://www.usnews.com/news/best-states/rankings/education/prek-12>

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