

Team Bazinga – Project Summary

Audience:

The ideal audience for this data is the parents of children who are about to enter the Nebraska Education system, and wish to find the ideal setting for their child to maximize their educational experience. This is achieved by looking at the data at a regional level and determine the effectiveness of education based on Standardized Test Scores.

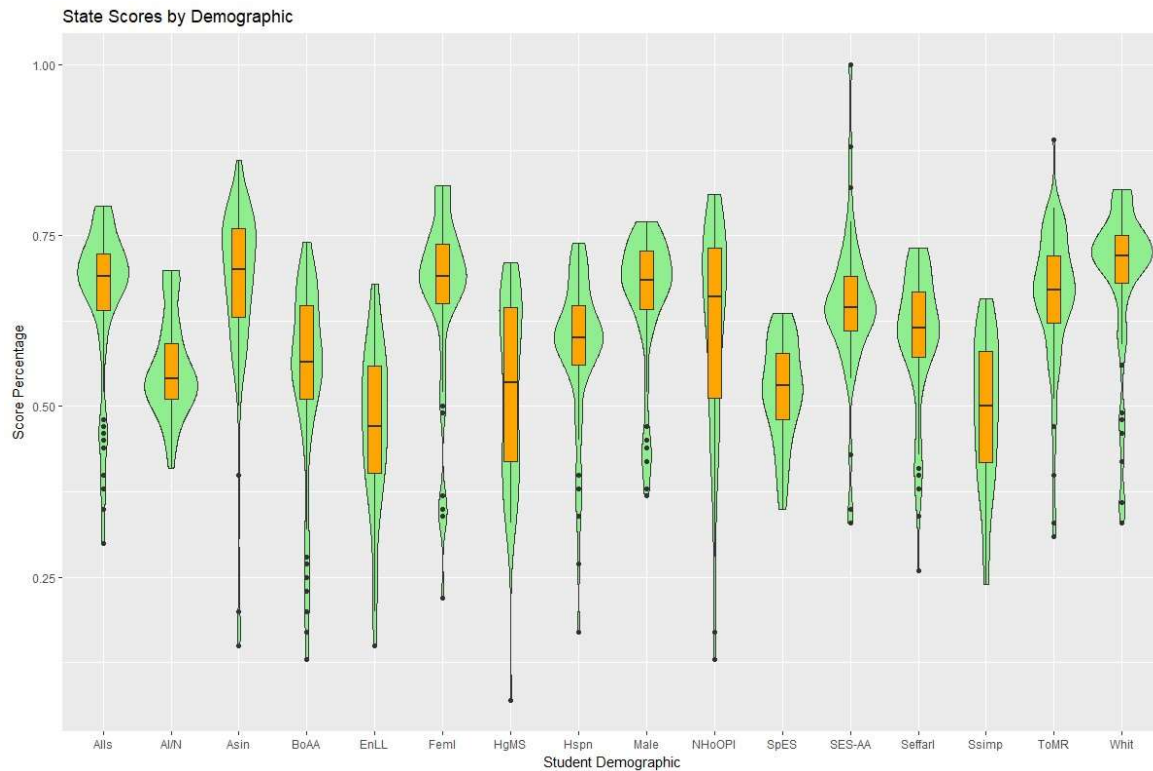
This information would also benefit School Administrators who care about the performance of their schools, and would like to find ways to improve the quality of education in Nebraska. This is achieved by looking at different variables affecting schools. These would be things like Drop-out rates, Graduation Rates, Teacher's education level.

Data Source Description and Processing:

The data was retrieved from the Nebraska Department of Education – Education Profile. There are many files that were provided, however, this team focused on exam scores, teacher profiles, drop-out rates and graduations rates. The data contained many null values that did not provide any value to our analysis. These records were removed from the data before we could start performing our analysis. After performing data cleaning and focusing on the question that could be answered we ended up with four data sets to start our analysis. As stated previously these four data sets were Test Scores, Teacher profiles, Drop-out Rates, and Graduation Rates.

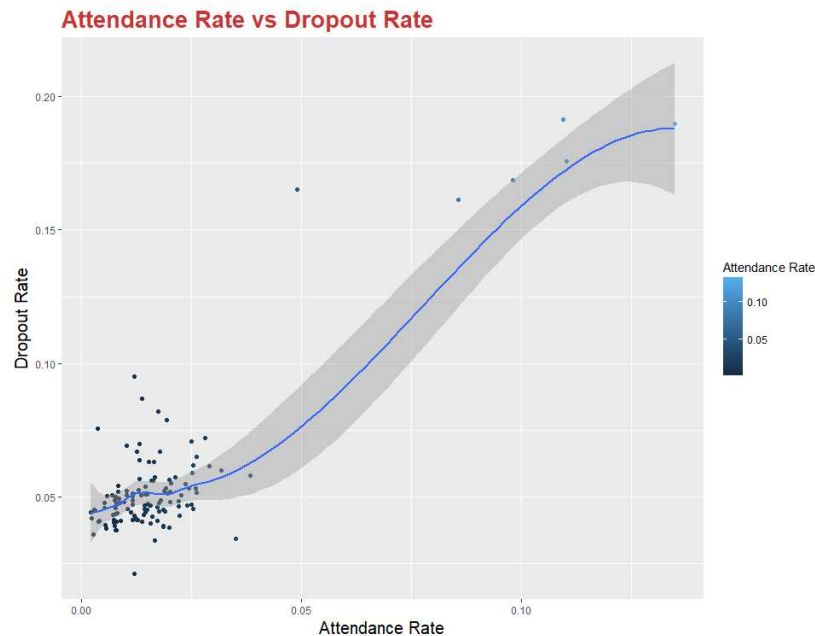
The Data retrieved from Nebraska Department of Education was interesting in itself, but we found it a bit lacking in some areas. We manually obtained data from USPS regarding Nebraska Counties, and manually pulled zip code information for each school in the Omaha Metro area. We were then able to combine the two data sets, which enabled us to perform Geolocation analysis. The reason we found it crucial to provide Geolocation analysis, is the speed at which people can look at a map, and quickly determine importance.

Plot 1 - Exam Scores by Student Demographic in Nebraska:



This is a Violin Plot. It is essentially a box plot, but with a normal distribution curve underneath. The purpose of this is to use the box plot to display outliers, quartiles, and median. The Violin part will show you if you have any issues with multiple modes (bimodal), and will tell you where a majority of your data are. The plot above is parsed by student demographic information, which includes items like, gender, race/ethnicity, and other/special needs. According to the plot, Whites have the highest median value, followed by Asian, Females, and Males. Whites having the highest median is no surprise because a vast majority of people in Nebraska are white. What is interesting, is that according to this data Females are smarter than Males. This should also not be a surprise, but it is nice to have data support the claim.

Plot 2 - Attendance Rate relationship to Drop-out Rate:



This plot is a combination of a Scatter Plot overlaid with a Regression line. What this plot shows is the relationship between student's attendance rate and student's drop-out rate. According to this plot there is a positive correlation. This means the less a student attends school, the more likely they are to drop-out of school. The more a student attends school, the less likely they are to drop-out. While this seems like an obvious analysis, we think it can easily be overlooked that attendance is a reflection of student satisfaction. If a student is not attending, this is probably a good indicator they are not happy with the current situation, and are finding other uses for their time. If you can increase student satisfaction, then absences will decrease and in turn decreasing the number of drop-outs.

Plot 3 - Teachers with Master's Degree by School District:

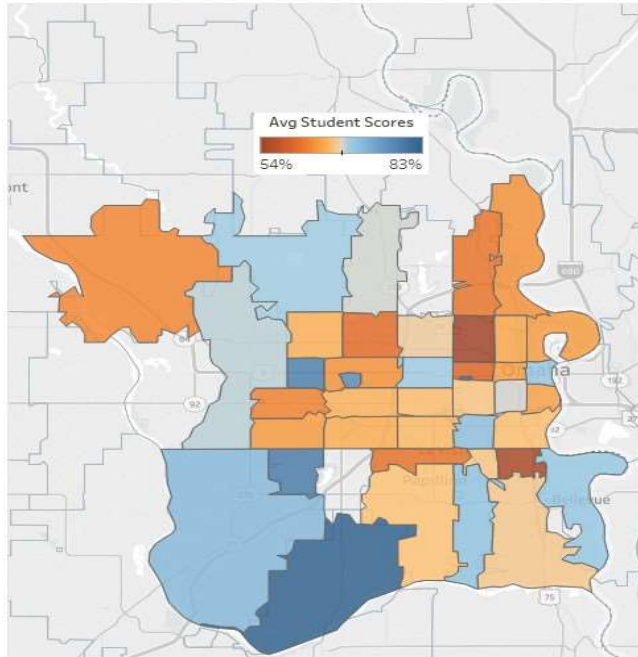


This plot is a time series graph showing the percentage of teachers with Master's degrees, for each year from 2011 to 2016, for each school district in Nebraska. Looking at the plot above you can see Grand Island school district has very low percentage of teachers with Master's degree. This could be

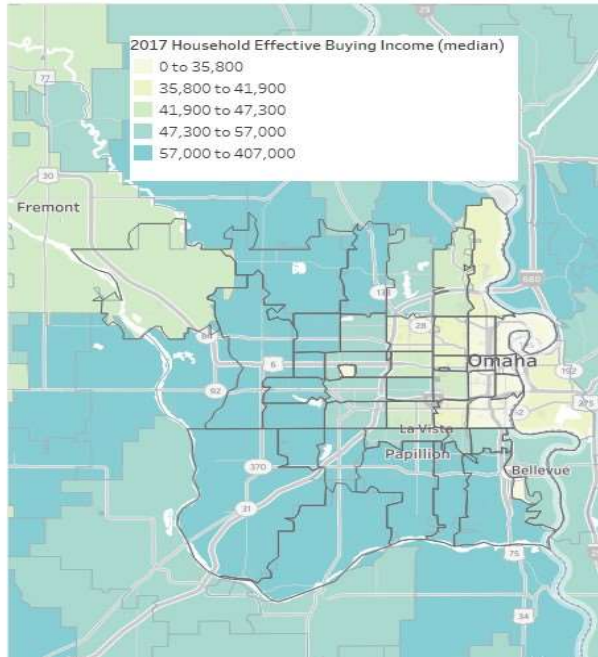
interpreted to mean that the quality of teachers is less than standard, but there is not enough evidence to confirm such a statement. What can be said is there are less educated teachers in the Grand Island system. Looking a little closer to home you can compare the teachers in Omaha Public Schools to the teachers in Millard Public Schools. 50% of the teachers in Omaha Public Schools have their master's degree. Millard Public Schools seems to have around 70% of teachers with a master's degree. This potentially means smarter teachers could develop smarter students.

Plot 4 - Student Test Scores in Douglas and Sarpy County:

Douglas/Sarpy Co Scores by Zipcode



Household Effective Buying Income



This plot was developed using Tableau Software. This is where the zip code information for each school became paramount. Without the zip code data for each school, this heat map would not have been possible. The graph on the left represents the average exam scores for all student, by zip code. This was used to show physically where the better test scores are coming from. This gives us insight on where some of the better schools are potentially located around the Omaha Metro. The graph on the right is actually data that was provided by the Tableau Software tool, as a data overlay. Merging the two images together made it difficult to understand. However, by putting them side by side you can start to see patterns emerge. The zip codes that are have a higher median disposable income seem to be in the same zip code as better test scores. It is not a perfect match, but there seems to be a socioeconomic trend, that can provide useful insight.

Decisions:

As a concerned parent, the information provided in the plots above can lead to some very interesting decision making. There are several factors that can contribute to the success of schools. The violin plot gave insight on the types of students in Nebraska and their exam scores. If exams were taken yearly then these exams from 2015-2016 could be a benchmark for educational performance. It should be recognized that exam scores are not all that useful in determining success or failure, but could be used to identify any potential issues that could arise at a state level.

The Attendance Rate compared to Drop-out Rate show a clear relationship between the two measures. Attendance Rate can be used as a representation of Student satisfaction and so it should be recognized that student satisfaction needs to be maximized as much as possible to keep students engaged, and in school. There are some additional benefits in keeping students engaged. Students who are not in school can often get involved with inner city gangs, and increase crime rates. As a society we should do the most we can to keep kids in school.

The third plot showed the percent of teachers with Master's degrees. Parents would be interested in this information because you would want your children to learn from smart adults. Teacher who have spent the time and money to further their own education, can do well to pass on those behaviors to their students. This information also says a lot about the school system as well. Teachers whom have master's degrees will expect to have a larger salary. Larger salaries are available in well-funded school systems. Well-funded school systems can provide students better access to resources and experiences.

The last Plot shows where the better exam scores are physically located. When you combine this other plots you start to see a clear picture. The better exam scores appear to be coming from the western and southern regions of the Omaha Metro. Millard, for example, has high percentage of teachers with master's degrees. The area around Millard has higher median incomes. All of these items begin to point towards where the better schools are located around the Omaha Metro.

Combining all of these pieces of information allows people to start recognizing where the better schools are. Families will want to put themselves in a position to get their children into those schools. We also think it would be important for school administrators to start evaluating the differences between the schools and start reproducing the things that are making some schools more successful than others. School administrators should also continue the effort of collecting more data so more analysis can be done, and better education can be gained by all students in Nebraska.

Word Count:

1407

References:

Jespersen, David (2016, December 12th) *Nebraska Education Profile Data Downloads*. Retrieved September 2nd, 2017 from <http://nep.education.ne.gov/Links>