Data Science Bootcamp

DATA-BASED ANALYTICS FOR PYCITY SCHOOL BOARD

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<u>Background</u>

As the new Chief Data Scientist for my city's school district, I have formulated analytics to enable the school board and mayor to make optimal strategic decisions concerning future school budgets, priorities, and allocations. These analytics are based not just on standardized test results but also on overall passing percentages. Differences in academic achievement, particularly in math and reading, are captured between the district and chartered schools. Student population size and budget are also considered potential determinants or influencers to assess further the degree of differences in results for 15 schools.

<u>Discussion</u>

7 of the 15 schools are district, while the remaining eight are chartered. So, categorically, the sample is a near 50:50 split. That is good. However, it's important to note that spread between the student size range from 427 to 4,976 students. School size is essential when comparing average math and reading scores. In general, smaller schools tend to have smaller budgets. Still, student-to-faculty ratios must be factored into the equation when comparing academic achievement among students attending small, medium, or large schools. Better-funded schools tend to have better facilities, equipment, and supplies, enhancing students' learning environment and experience. Better books, libraries, and computer labs are a few benefits of more robust budgets.

Many other factors impact academic performance and ranking. Staff and faculty make a tremendous difference in the life of these high-school students. Let's remember demographics and their impact. Does salary for teachers and staff differ between chartered and district schools? Aside from all of these, the individual student plays a crucial role in their academic performance.

The learning journey is not limited to school but includes what happens at home. The list of variables could go on and on. Here, we look at school size, budget, budget per student, and school type while analyzing average scores for math and reading. Additionally, we look at passing percentages in math, reading, and overall.

<u>Findings</u>

This analysis suggests that charter schools perform better than district schools in math and reading. Charter schools also attained higher passing percentages overall, in addition to math and reading passing rates. Despite having larger school budgets, on average, students attending large district schools achieved significantly lower math and reading scores than charter schools. The following tables substantiate the following conclusions:

- Students attending charter schools perform better in math and reading than those at district schools.

School Type	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Charter	83.473852	83.896421	93.620830	96.586489	90.432244
District	76.956733	80.966636	66.548453	80.799062	53.672208

- Cabrera High School, a medium-sized charter school, had the highest ratings but didn't have the most prominent school budget.

School Name	School Type	Total Students	Total School Budget	Per Student Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Bailey High School	District	4976	$3,124,928.00	$628.00	77.048432	81.033963	66.680064	81.933280	54.642283
Cabrera High School	Charter	1858	$1,081,356.00	$582.00	83.061895	83.975780	94.133477	97.039828	91.334769
Figueroa High School	District	2949	$1,884,411.00	$639.00	76.711767	81.158020	65.988471	80.739234	53.204476
Ford High School	District	2739	$1,763,916.00	$644.00	77.102592	80.746258	68.309602	79.299014	54.289887
Griffin High School	Charter	1468	$917,500.00	$625.00	83.351499	83.816757	93.392371	97.138965	90.599455
Hernandez High School	District	4635	$3,022,020.00	$652.00	77.289752	80.934412	66.752967	80.862999	53.527508
Holden High School	Charter	427	$248,087.00	$581.00	83.803279	83.814988	92.505855	96.252927	89.227166
Huang High School	District	2917	$1,910,635.00	$655.00	76.629414	81.182722	65.683922	81.316421	53.513884
Johnson High School	District	4761	$3,094,650.00	$650.00	77.072464	80.966394	66.057551	81.222432	53.539172
Pena High School	Charter	962	$585,858.00	$609.00	83.839917	84.044699	94.594595	95.945946	90.540541
Rodriguez High School	District	3999	$2,547,363.00	$637.00	76.842711	80.744686	66.366592	80.220055	52.988247
Shelton High School	Charter	1761	$1,056,600.00	$600.00	83.359455	83.725724	93.867121	95.854628	89.892107
Thomas High School	Charter	1635	$1,043,130.00	$638.00	83.418349	83.848930	93.272171	97.308869	90.948012
Wilson High School	Charter	2283	$1,319,574.00	$578.00	83.274201	83.989488	93.867718	96.539641	90.582567
Wright High School	Charter	1800	$1,049,400.00	$583.00	83.682222	83.955000	93.333333	96.611111	90.333333

- Medium-sized schools performed better than small and large schools.

School Size	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Small (<999)	83.82	83.93	93.55	96.10	89.88
Medium (999-1999)	83.37	83.86	93.60	96.79	90.62
Large (1999-4999)	77.75	81.34	69.96	82.77	58.29

- Students within the <$585 per student category outperformed other tiers.

Spending Ranges (Per Student)	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
<$585	83.46	83.93	93.46	96.61	90.37
$585-630	81.90	83.16	87.13	92.72	81.42
$630-645	78.52	81.62	73.48	84.39	62.86
$645-680	77.00	81.03	66.16	81.13	53.53

Recommendation

Based on this data, the school board should investigate the educational disparities further before launching a major fiscal reallocation initiative. This data clearly shows that while budget matters, it doesn't guarantee better academic results. Given the economies and efficiencies gained from smaller classroom sizes, it would make sense to devise ways to shrink the large district schools in size. Re-zoning is a potential solution to balance student population and classroom sizes. I recommend finding ways to duplicate charter schools' facilities, equipment, curriculum, and programs. Applying best practices from high-performing charter schools may provide a better model for district schools.

Baily High School, a large district school with a population of 4,976 students, has a $3.1M budget. However, this school has a 54% overall passing rate. Again, Cabrera High School is a medium-sized charter school with a $1M budget and yields a 91% overall passing rate. This, coupled with the fact that students with less than $585 per student achieve the best results, prove that the solution to attain academic congruence must include other synergies that effect classroom excellence.