PyCity Schools Analysis

As part of this week's challenge, I was tasked to analyse PyCity Schools in terms of their performances in math and reading for both District and Charter Schools. I took reference for both CSV files for schools and students for the district. Listed below is a summary of my findings and conclusions from this week's challenge:

1. Overall, it seems that when more resources are spent on something, the better its performance should be. But the data does show the opposite. The schools with the lowest spending ranges (less than $585 per student) have delivered better results in average math and reading scores as well as better passing rates for students overall and in both math and reading. These schools not only had lower per student budget, but their overall total budgets were also less compared to other schools in the district.

2. Small-sized (less than 1000 students) and medium-sized (1000 to 2000 students) had almost similar average scores (about 83 for both math and reading) and passing rates (about 93% for math, 96% for reading, and 90% overall). These schools outperformed the large-sized schools (2000 to 5000 students) especially in terms of passing scores.

3. Charter schools clearly outperformed the District schools by having higher average scores as well as passing rates. The top 5 best performing schools based on overall scores are Charter whereas the bottom 5 are District. It could be to the fact that charter schools have a smaller number of students, but no correlation can be drawn from the provided data to support this reasoning. It shows that students in all grades had almost similar academic performance across all categories.

4. To summarise, students tend to perform better in reading (79%-97%) as compared to maths (65%-94%) in terms of passing scores. The overall passing rates (52%-91%) are comparatively lower than the average of passing rates for math and reading. This indicates that not all the students scoring 70 or higher in math are scoring the same in reading and the other way around.

The points above are conclusions based on the PyCity Analysis after analysing both CSV data files.

District Summary

	Total Schools	Total Students	Total Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
0	15	39,170	$24,649,428.00	78.985371	81.877840	74.981%	85.805%	65.172%

- 15 schools in the district.
- Total number of students in all schools is 39,170.
- Total budget for the district is $24,649,428.00.
- Average math score in the district schools is 79.985371.
- Average reading score in the district schools is 81.877840.
- 74.981% of students in the district passed math by achieving a score of 70 or higher.
- 85.805% of students in the district passed reading by achieving a score of 70 or higher.
- 65.172% of students in the district passed both math and reading by achieving a score of 70 or higher in both the subjects.

School Summary

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	3124928.0	628.0	77.048432	81.033963	66.680064	81.933280	54.642283
Cabrera High School	Charter	1858	1081356.0	582.0	83.061895	83.975780	94.133477	97.039828	91.334769
Figueroa High School	District	2949	1884411.0	639.0	76.711767	81.158020	65.988471	80.739234	53.204476
Ford High School	District	2739	1763916.0	644.0	77.102592	80.746258	68.309602	79.299014	54.289887
Griffin High School	Charter	1468	917500.0	625.0	83.351499	83.816757	93.392371	97.138965	90.599455
Hernandez High School	District	4635	3022020.0	652.0	77.289752	80.934412	66.752967	80.862999	53.527508
Holden High School	Charter	427	248087.0	581.0	83.803279	83.814988	92.505855	96.252927	89.227166
Huang High School	District	2917	1910635.0	655.0	76.629414	81.182722	65.683922	81.316421	53.513884
Johnson High School	District	4761	3094650.0	650.0	77.072464	80.966394	66.057551	81.222432	53.539172
Pena High School	Charter	962	585858.0	609.0	83.839917	84.044699	94.594595	95.945946	90.540541
Rodriguez High School	District	3999	2547363.0	637.0	76.842711	80.744686	66.366592	80.220055	52.988247
Shelton High School	Charter	1761	1056600.0	600.0	83.359455	83.725724	93.867121	95.854628	89.892107
Thomas High School	Charter	1635	1043130.0	638.0	83.418349	83.848930	93.272171	97.308869	90.948012
Wilson High School	Charter	2283	1319574.0	578.0	83.274201	83.989488	93.867718	96.539641	90.582567
Wright High School	Charter	1800	1049400.0	583.0	83.682222	83.955000	93.333333	96.611111	90.333333

- Charter schools have a smaller number of students ranging between 427 to 2283 students for eight schools in the district.
- District schools have a greater number of students ranging between 2739 to 4976 students for seven schools in the district.
- Total budget for Charter schools is lower ranging between $0.25 to $1.32 million.
- Total budget for District schools is higher ranging between $1.76 $3.12 million dollars.
- Budget per student for Charter schools ranges between $578 to $638 per student
- Budget per student for District schools ranges between $628 to $655 per student
- Total budget for schools is higher for the schools with more students (which is evident for most District schools). However, the budget per student does not follow the same pattern for all schools. There are some Charter schools with lesser students but have a higher budget resulting in higher per student budget.
- The students enrolled in Charter schools have higher math scores on average compared to the students enrolled in District schools. The percentage of students passing maths by achieving a score of 70 or higher is also higher in Charter schools compared to District schools.
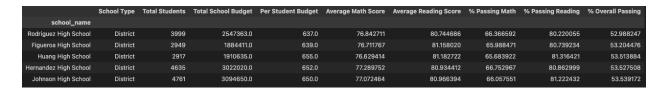
- The students enrolled in Charter schools have higher reading scores on average compared to the students enrolled in District schools. The percentage of students passing reading by achieving a score of 70 or higher is also higher in Charter schools compared to District schools.
- The overall passing rate (students passing both maths and reading) is also higher in Charter schools compared to District schools.
- The students enrolled in Charter schools tend to outperform the students enrolled in District schools in both maths and reading by achieving higher average scores as well as higher passing percentages. The overall passing rate is also substantially higher for Charter school students.
- The passing rates are usually higher for reading compared to maths.

Highest Performing Schools (by %Overall Passing)

school_name	School Type	Total Students	Total School Budget	Per Student Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Cabrera High School	Charter	1858	1081356.0	582.0	83.061895	83.975780	94.133477	97.039828	91.334769
Thomas High School	Charter	1635	1043130.0	638.0	83.418349	83.848930	93.272171	97.308869	90.948012
Griffin High School	Charter	1468	917500.0	625.0	83.351499	83.816757	93.392371	97.138965	90.599455
Wilson High School	Charter	2283	1319574.0	578.0	83.274201	83.989488	93.867718	96.539641	90.582567
Pena High School	Charter	962	585858.0	609.0	83.839917	84.044699	94.594595	95.945946	90.540541

- The highest performing schools based on overall passing rate are Charter schools with over about 90% students achieving a score of 70 or higher in both math and reading.
- The per student budget is not necessarily higher for the school with the best overall score. This might indicate that the total spending per student might not have a direct influence on the performance of students.

Bottom Performing Schools (by %Overall Passing)

school_name	School Type	Total Students	Total School Budget	Per Student Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Rodriguez High School	District	3999	2547363.0	637.0	76.842711	80.744686	66.366592	80.220055	52.988247
Figueroa High School	District	2949	1884411.0	639.0	76.711767	81.158020	65.988471	80.739234	53.204476
Huang High School	District	2917	1910635.0	655.0	76.629414	81.182722	65.683922	81.316421	53.513884
Hernandez High School	District	4635	3022020.0	652.0	77.289752	80.934412	66.752967	80.862999	53.527508
Johnson High School	District	4761	3094650.0	650.0	77.072464	80.966394	66.057551	81.222432	53.539172

- The bottom performing schools based on overall passing rate are District schools with less than about 53% students obtaining a score of 70 or higher in both math and reading.
- The per student budget is higher for the school with the worst overall scores. This might indicate that the total spending per student might not have a direct influence on the performance of students.

Math Scores by Grade

	9th	10th	11th	12th
Bailey High School	77.083676	76.996772	77.515588	76.492218
Cabrera High School	83.094697	83.154506	82.765560	83.277487
Figueroa High School	76.403037	76.539974	76.884344	77.151369
Ford High School	77.361345	77.672316	76.918058	76.179963
Griffin High School	82.044010	84.229064	83.842105	83.356164
Hernandez High School	77.438495	77.337408	77.136029	77.186567
Holden High School	83.787402	83.429825	85.000000	82.855422
Huang High School	77.027251	75.908735	76.446602	77.225641
Johnson High School	77.187857	76.691117	77.491653	76.863248
Pena High School	83.625455	83.372000	84.328125	84.121547
Rodriguez High School	76.859966	76.612500	76.395626	77.690748
Shelton High School	83.420755	82.917411	83.383495	83.778976
Thomas High School	83.590022	83.087886	83.498795	83.497041
Wilson High School	83.085578	83.724422	83.195326	83.035794
Wright High School	83.264706	84.010288	83.836782	83.644986

- Scores for 9th graders range between 76.40 to 83.79.
- Scores for 10th graders range between 75.91 to 84.23.
- Scores for 11th graders range between 76.40 to 85.00.
- Scores for 12th graders range between 76.18 to 84.12.
- Students enrolled in all grades had similar performance in maths and have average grades in range between 76 to 85.

Reading Scores by Grade

	9th	10th	11th	12th
Bailey High School	81.303155	80.907183	80.945643	80.912451
Cabrera High School	83.676136	84.253219	83.788382	84.287958
Figueroa High School	81.198598	81.408912	80.640339	81.384863
Ford High School	80.632653	81.262712	80.403642	80.662338
Griffin High School	83.369193	83.706897	84.288089	84.013699
Hernandez High School	80.866860	80.660147	81.396140	80.857143
Holden High School	83.677165	83.324561	83.815534	84.698795
Huang High School	81.290284	81.512386	81.417476	80.305983
Johnson High School	81.260714	80.773431	80.616027	81.227564
Pena High School	83.807273	83.612000	84.335938	84.591160
Rodriguez High School	80.993127	80.629808	80.864811	80.376426
Shelton High School	84.122642	83.441964	84.373786	82.781671
Thomas High School	83.728850	84.254157	83.585542	83.831361
Wilson High School	83.939778	84.021452	83.764608	84.317673
Wright High School	83.833333	83.812757	84.156322	84.073171

- Scores for 9th graders range between 80.63 to 84.12.
- Scores for 10th graders range between 80.63 to 84.25.
- Scores for 11th graders range between 80.40 to 84.37.
- Scores for 12th graders range between 80.31 to 84.70.
- Students enrolled in all grades had similar performance in reading and have average grades in the range between 80 to 85.

Scores by School Spending

Spending Ranges (Per Student)	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
<$585	83.455399	83.933814	93.460096	96.610877	90.369459
$585-630	81.899826	83.155286	87.133538	92.718205	81.418596
$630-645	78.518855	81.624473	73.484209	84.391793	62.857656
$645-680	76.997210	81.027843	66.164813	81.133951	53.526855

- The data in the scores by school spending summary indicates that the average scores and passing rates are inversely proportional to the spending per student.
- Schools with lowest spending per student (less than $585) had the best average maths and reading scores as well as the best overall passing rates including maths and reading.
- Schools with highest spending per student between $645-$680 had the lowest average maths and reading scores as well as the lowest overall passing rates including maths and reading.

Scores by School Size

School Size	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Small (<1000)	83.821598	83.929843	93.550225	96.099437	89.883853
Medium (1000-2000)	83.374684	83.864438	93.599695	96.790680	90.621535
Large (2000-5000)	77.746417	81.344493	69.963361	82.766634	58.286003

- Large-size schools with students ranging between 2000 to 5000 had the lowest average scores for both maths and reading. Large-sized schools also had the lowest overall passing rates as well as lowest passing rates for maths and reading.
- Small-sized schools (less than 1000) and medium sized schools (1000-2000) had almost similar performance which was better than large-sized schools.
- Small-sized schools had a very slightly higher average maths and reading score compared to medium-sized schools. Medium-sized schools had a very slightly higher passing rate for maths and reading as well as overall results. These differences are not conclusive to draw a conclusion between small and medium sized schools. This does imply that a few students in small schools scored higher in both maths and reading driving the average scores to a higher number. However, the number of students achieving higher scores (70 or more) for small schools was slightly less compared to medium schools.
- These findings are not significant to draw a conclusive statement.

Scores by School Type

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

- Students enrolled in Charter schools have outperformed the students enrolled in District schools in all categories. They had higher average scores as well as better passing rates.
- Students in both Charter and District schools had better performances in reading as compared to math especially in terms of the passing rates.
- Overall passing rates for both Charter and District schools are lower than the passing rates in math and reading.
- This implies that not all students getting a passing score in math are getting the same for reading and the other way around.