Assignment 4 – Module 4 Challenge - Writeup Steph Abegg

Due: July 22, 2024 at 11:59 pm

Jupyter Notebook

See PyCitySchools.ipynb for the required Pandas and Jupiter Notebook work. I have pasted in some of my output tables in this document to support my conclusions.

Summary of Analysis

In this challenge, we were given two datasets. One was a list of schools in a certain district (columns: school ID, school name, type, size, and budget). The other was a list of students at these schools (columns: student ID, student name, gender, grade, school name, reading score, and math score). We were asked to join these tables and create some summary tables ranking the schools by student performance and tabulating the around the number of students, total budget, average math and reading scores, and percent passing math and reading and both. The requested output tables (taken as screenshots from the Jupiter Notebook output) are given in this document.

Some Conclusions

We were asked to draw at least two conclusions about the data from the output of the analysis. Here are four conclusions:

1. The average math scores (and % passing math) are less than the average reading scores (and % passing reading) for all schools (Charter and District) and for all grades. This indicates a general trend that students struggle more at math than at reading. The percentage passing is relatively static for all grade levels at any given school, indicating that there is no improvement or decline with grade level.

2. In general, the students at Charter schools perform better than students at District schools, in both math and reading. The five highest performing schools (by % overall passing) are all Charter and the five lowest performing schools (by % overall passing) are all District. The overall passing rate of Charter schools is 90.4% while the overall passing rate of District schools is 53.7%.

3. Counterintuitively, the results show that, in general, increasing school budget per student does not increase performance, in either math or reading. Highest average math and reading scores are actually seen at the lowest budget range of <$585 and the lowest average math and reading scores are seen at the highest budget range of $645-680. The reason for this result is that government-funded District schools have a higher budget than privately-funded Charter schools, and as mentioned above, District schools show a significantly lower performance than Charter schools.

4. Performance increases as school size deceases. This is evidenced by the fact the schools with <1000 students have the highest average math and reading scores and passing rates and large schools 2000-5000 students have the lowest average math and reading scores and passing rates.

Like performance and budget, performance and size can be correlated with the type of school, since District schools (which have lower performance) tend to be larger in size than Charter schools (which have higher performance).

Output Tables

The requested output tables (taken as screenshots from the Jupiter Notebook output) are given below.

District Summary

Total Schools	Total Students	Total Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
15	39,170	$24,649,428.00	78.99	81.88	74.98	85.81	65.17

School Summary

	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	77.05	81.03	66.68	81.93	54.64
Cabrera High School	Charter	1858	$1,081,356.00	$582.00	83.06	83.98	94.13	97.04	91.33
Figueroa High School	District	2949	$1,884,411.00	$639.00	76.71	81.16	65.99	80.74	53.20
Ford High School	District	2739	$1,763,916.00	$644.00	77.10	80.75	68.31	79.30	54.29
Griffin High School	Charter	1468	$917,500.00	$625.00	83.35	83.82	93.39	97.14	90.60
Hernandez High School	District	4635	$3,022,020.00	$652.00	77.29	80.93	66.75	80.86	53.53
Holden High School	Charter	427	$248,087.00	$581.00	83.80	83.81	92.51	96.25	89.23
Huang High School	District	2917	$1,910,635.00	$655.00	76.63	81.18	65.68	81.32	53.51
Johnson High School	District	4761	$3,094,650.00	$650.00	77.07	80.97	66.06	81.22	53.54
Pena High School	Charter	962	$585,858.00	$609.00	83.84	84.04	94.59	95.95	90.54
Rodriguez High School	District	3999	$2,547,363.00	$637.00	76.84	80.74	66.37	80.22	52.99
Shelton High School	Charter	1761	$1,056,600.00	$600.00	83.36	83.73	93.87	95.85	89.89
Thomas High School	Charter	1635	$1,043,130.00	$638.00	83.42	83.85	93.27	97.31	90.95
Wilson High School	Charter	2283	$1,319,574.00	$578.00	83.27	83.99	93.87	96.54	90.58
Wright High School	Charter	1800	$1,049,400.00	$583.00	83.68	83.96	93.33	96.61	90.33

Highest and Lowest Performing Schools (by % Overall Passing)

Highest Performing

	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	$1,081,356.00	$582.00	83.06	83.98	94.13	97.04	91.33
Thomas High School	Charter	1635	$1,043,130.00	$638.00	83.42	83.85	93.27	97.31	90.95
Griffin High School	Charter	1468	$917,500.00	$625.00	83.35	83.82	93.39	97.14	90.60
Wilson High School	Charter	2283	$1,319,574.00	$578.00	83.27	83.99	93.87	96.54	90.58
Pena High School	Charter	962	$585,858.00	$609.00	83.84	84.04	94.59	95.95	90.54

Lowest Performing

	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	$2,547,363.00	$637.00	76.84	80.74	66.37	80.22	52.99
Figueroa High School	District	2949	$1,884,411.00	$639.00	76.71	81.16	65.99	80.74	53.20
Huang High School	District	2917	$1,910,635.00	$655.00	76.63	81.18	65.68	81.32	53.51
Hernandez High School	District	4635	$3,022,020.00	$652.00	77.29	80.93	66.75	80.86	53.53
Johnson High School	District	4761	$3,094,650.00	$650.00	77.07	80.97	66.06	81.22	53.54

Math and Reading Scores by Grade

Math

	9th	10th	11th	12th
Bailey High School	77.08	77.00	77.52	76.49
Cabrera High School	83.09	83.15	82.77	83.28
Figueroa High School	76.40	76.54	76.88	77.15
Ford High School	77.36	77.67	76.92	76.18
Griffin High School	82.04	84.23	83.84	83.36
Hernandez High School	77.44	77.34	77.14	77.19
Holden High School	83.79	83.43	85.00	82.86
Huang High School	77.03	75.91	76.45	77.23
Johnson High School	77.19	76.69	77.49	76.86
Pena High School	83.63	83.37	84.33	84.12
Rodriguez High School	76.86	76.61	76.40	77.69
Shelton High School	83.42	82.92	83.38	83.78
Thomas High School	83.59	83.09	83.50	83.50
Wilson High School	83.09	83.72	83.20	83.04
Wright High School	83.26	84.01	83.84	83.64

Reading

	9th	10th	11th	12th
Bailey High School	81.30	80.91	80.95	80.91
Cabrera High School	83.68	84.25	83.79	84.29
Figueroa High School	81.20	81.41	80.64	81.38
Ford High School	80.63	81.26	80.40	80.66
Griffin High School	83.37	83.71	84.29	84.01
Hernandez High School	80.87	80.66	81.40	80.86
Holden High School	83.68	83.32	83.82	84.70
Huang High School	81.29	81.51	81.42	80.31
Johnson High School	81.26	80.77	80.62	81.23
Pena High School	83.81	83.61	84.34	84.59
Rodriguez High School	80.99	80.63	80.86	80.38
Shelton High School	84.12	83.44	84.37	82.78
Thomas High School	83.73	84.25	83.59	83.83
Wilson High School	83.94	84.02	83.76	84.32
Wright High School	83.83	83.81	84.16	84.07

Scores by School Spending, School Size, and School Type

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Spending Ranges (Per Student)					
<$585	83.45	83.94	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

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Size					
Small (<1000)	83.82	83.93	93.55	96.10	89.88
Medium (1000-2000)	83.37	83.87	93.60	96.79	90.62
Large (2000-5000)	77.74	81.34	69.96	82.77	58.28

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Type					
Charter	83.47	83.90	93.62	96.59	90.43
District	76.96	80.97	66.55	80.80	53.67