**District Summary**

This portion of the code calculates overall metrics at the school district level. On an overall district level, we computed total students, students' average score for math and reading and passing rates (for each of reading, math and both). We also computed the total number of schools within the district, the school district's budget and combined all these results into a simple summary using a data frame to help visualize the results.



**School Summary**

The purpose of this part of the analysis was to dig deeper into the performance and metrics of each individual school (and their students) by using the student data split by school to assess how each institution compares to other institutions within the district.

For the first few steps, we were interested in understanding the number of students, average subject scores, budget per student (per capita budget), and passing rates for each individual school. To do this, I worked with the school\_data csv spreadsheet and used groupby functions to split the data by school name. I then employed series mathematics on the relevant columns (size, type, budget, etc.) to compute the metrics mentioned above. We concluded this section by creating a data frame that combined data from the original school\_data csv file with the results from my series math operations in prior steps. These results are shown in the image below.

Per School Summary

A screenshot of a blue screen

Description automatically generated

For the second part/set of steps, we then explore how student performance across both subjects varies by grade (grades 9th to 12th). For this, we filtered the data on the combined school data data frame to “extract” the students in each respective grade. We then used each of the filtered data sets, grouped by school, to get scores at each institution, and computed the average (mean) scores for reading and math for each grade within each school. Results shown below.

Math Scores by Grade

A table with numbers and letters

Description automatically generated

Reading Scores by Grade

A table with numbers and letters

Description automatically generated

For the final step, we dig deeper into how the school’s budget per capita (budget allocation per student) and size contribute/influence overall grades and passing rates at each school, and whether the school type (charter or district) makes a difference in these same metrics.

For the per capita budget and size calculations, we used the .cut function to assign each row of data in the Per School Summary table shown above to a corresponding bin from a series created for each metric (one for spending/budget per capital and one for size/number of students). We then computed the average scores and passing rates for each per capita budget and size bins so that we can understand how each cohort performed and discern how student count and budget size affect overall student performance. The images below show the summary data frames.

Scores & Passing Rates by Budget Per Capita

A screenshot of a blue screen

Description automatically generated

Scores & Passing Rates by School Size (Student Count)

A screenshot of a blue screen

Description automatically generated

To analyze the same information by school type, I also grouped the Per School Summary data using the school type column (Type) and computed the average (mean) values for each metric, which gave me the results shown in the data frame snapshot below.

A screenshot of a graph

Description automatically generated

In addition to these, we also sorted the data in the Per School Summary data frame and printed the first five rows using a .head(5) function to identify the top and bottom five schools.

**Analysis of the Results**

District Data

Assuming that “passing” a subject means scoring 70 pts or higher, this table shows that students in general seem to be struggling with math, getting an average score of ~79 (74% pass rate). The reading scores are better at ~82 (86% pass rate), but the low overall pass rate 65.17% suggests that students are struggling to keep up with both subjects and are failing at least one of them (most commonly math).

School Data

School Type and Performance

Charter Schools consistently outperform district schools in terms of test scores and passing percentages. Their students achieve higher academic results even with lower per-student budgets. This is visible in the top schools data frame which shows that the top 5 schools are all Charter schools.

Conversely, District Schools tend to underperform compared to charter schools despite having larger budgets often. The bottom schools data frame corroborates this by showing us that the worst 5 schools are all District Schools.

Per-Student Budget and Performance

Interestingly, higher per-student spending doesn't correlate with better student outcomes. In fact, the data shows that student performance decreases with larger per capita budgets. This may indicate that factors like school management, teaching quality, and resource allocation may be more critical.

Lower Spending Schools (<$585 per student) achieve the highest academic results, which could mean they use of fewer resources more efficiently. Highest Per-Student Budgets ($645-$680) perform the worst on average, challenging the notion that higher funding leads to better performance.

School Size and Performance

The data shows that school size and student performance are inversely related. Medium to smaller schools are the best performers, likely due to smaller class sizes and a higher degree of personalized instruction. In the meantime, larger schools underperform across the board, suggesting that challenges of managing a large student can impact academic results.

Overall Conclusion

Charter schools with lower per-student budgets and smaller or medium-sized student populations outperform larger District schools with higher budgets. Also, higher spending does not necessarily correlate with better performance.