



PyCitySchools – Module 4 Challenge

William Douglas Smith – February 8, 2020

I was sorry to hear about the dishonesty issue with the Freshmen class at Thomas High School. Per your request, I have recalibrated scores for particular class, in a manner that I think is fair for the school and the district.

The first thing I did was to isolate the student data for the Thomas freshman and convert their grades, in both math and reading, to NaN values. I put the results in a DataFrame called “thomas_frosh_df” and saved to a .csv file that I called “thomas_frosh.csv”. I have included in the Resources folder of my GitHub repository so that you can see that work.

I then produced another DataFrame, called “thomas_nonfrosh_df”, for the rest of Thomas students who were not tainted by the dishonesty issue. Finally, a third DataFrame, called “non_thomas_students_df”, to include the remainder of district students, not attending Thomas High School.

The three DataFrames were merged into one named “student_data_clean_df”. The data was then exported to a .csv file called “student_data_clean.csv”. The grades are null for the Thomas freshman and remain what they were for the rest of the students in the district. I have included the .csv file in the GitHub Resources folder so you can see my work to this point.

The next step was to reassign grades to the Thomas freshman because of the taint of the dishonesty matter. The initial thinking was to zero out the scores, but it would be unfair to the rest of Thomas High School, uninvolved in the cheating, as well as to the rest of the district, so I have assigned the Thomas freshmen grades of 59 in both reading and math. This procedure and its results are captured in a new DataFrame and .csv file called “clean_students_df” and “clean_students.csv”, respectively. Once again, the saved .csv file has been saved to the Resources folder in GitHub.

Based on the updated data, I will be comparing district performance to the results produced prior to the dishonesty issue coming to light.

The first comparison will be the summary data for the district as a whole, then analyzing the data on a more micro basis, for individual schools and grades, comparing charter and district schools, comparing sizes of schools as well as comparing schools based upon their spending per student.

First of all, here is the summary data, based on upon the revision of Thomas freshman grades to “59”.

Overall District Results - Post-Thomas High School 9th Grade Adjustment

	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	78.7	81.6	74	85	64

You can see, in comparing this data to the original results below, that the overall performance of the district, as a whole, has eroded slightly due to the impact of the grade reassignments.

Overall District Results - Pre-Thomas High School 9th Grade Adjustment

	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	79.0	81.9	75	86	65

The next comparison looks at the performances of the schools themselves. Here are the district’s Top 5 schools (based upon % overall passing) post grade adjustments.

Top 5 Performing Schools - Post-Thomas High School 9th Grade Adjustment

	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	1,858	\$1,081,356.00	\$582.00	83.1	84.0	94.1	97.0	91.3
Griffin High School	Charter	1,468	\$917,500.00	\$625.00	83.4	83.8	93.4	97.1	90.6
Wilson High School	Charter	2,283	\$1,319,574.00	\$578.00	83.3	84.0	93.9	96.5	90.6
Pena High School	Charter	962	\$585,858.00	\$609.00	83.8	84.0	94.6	95.9	90.5
Wright High School	Charter	1,800	\$1,049,400.00	\$583.00	83.7	84.0	93.3	96.6	90.3

And here are the Top 5 prior to the adjustments.

Top 5 Performing Schools - Pre-Thomas High School 9th Grade Adjustment

	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	1,858	\$1,081,356.00	\$582.00	83.1	84.0	94.1	97.0	91.3
Thomas High School	Charter	1,635	\$1,043,130.00	\$638.00	83.4	83.8	93.3	97.3	90.9
Griffin High School	Charter	1,468	\$917,500.00	\$625.00	83.4	83.8	93.4	97.1	90.6
Wilson High School	Charter	2,283	\$1,319,574.00	\$578.00	83.3	84.0	93.9	96.5	90.6
Pena High School	Charter	962	\$585,858.00	\$609.00	83.8	84.0	94.6	95.9	90.5

You'll notice that Thomas High School has dropped out of the Top 5 because of the issue involving their 9th grade students.

We are now going to look at the Bottom 5 schools in the district. These results remained the same as none of the schools here were impacted by the grade reassignments.

Bottom 5 Performing Schools - Post-Thomas High School 9th Grade Adjustment

	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	3,999	\$2,547,363.00	\$637.00	76.8	80.7	66.4	80.2	53.0
Figueroa High School	District	2,949	\$1,884,411.00	\$639.00	76.7	81.2	66.0	80.7	53.2
Hernandez High School	District	4,635	\$3,022,020.00	\$652.00	77.3	80.9	66.8	80.9	53.5
Huang High School	District	2,917	\$1,910,635.00	\$655.00	76.6	81.2	65.7	81.3	53.5
Johnson High School	District	4,761	\$3,094,650.00	\$650.00	77.1	81.0	66.1	81.2	53.5

Bottom 5 Performing Schools - Pre-Thomas High School 9th Grade Adjustment

	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	3,999	\$2,547,363.00	\$637.00	76.8	80.7	66.4	80.2	53.0
Figueroa High School	District	2,949	\$1,884,411.00	\$639.00	76.7	81.2	66.0	80.7	53.2
Hernandez High School	District	4,635	\$3,022,020.00	\$652.00	77.3	80.9	66.8	80.9	53.5
Huang High School	District	2,917	\$1,910,635.00	\$655.00	76.6	81.2	65.7	81.3	53.5
Johnson High School	District	4,761	\$3,094,650.00	\$650.00	77.1	81.0	66.1	81.2	53.5

Since there are only 15 schools in the District, I thought it would be prudent, at this point to look at performance data for all of the school members and see how the reassignment affected the Thomas rank. Originally, Thomas was #2 on the list, but they slid to #8 after the reassignment, last among Charter schools. Even so, their overall performance, despite the penalization, they still outperformed all seven of the District schools.

All District Schools - Post-Thomas High School 9th Grade Adjustment

	School Type	Total Students	Total School Budget	Per Student Budget	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing	Spending Ranges (Per Student)
Cabrera High School	Charter	1,858	\$1,081,356.00	\$582.00	83.1	84.0	94.1	97.0	91.3	<\$584
Griffin High School	Charter	1,468	\$917,500.00	\$625.00	83.4	83.8	93.4	97.1	90.6	\$585-629
Wilson High School	Charter	2,283	\$1,319,574.00	\$578.00	83.3	84.0	93.9	96.5	90.6	<\$584
Pena High School	Charter	962	\$585,858.00	\$609.00	83.8	84.0	94.6	95.9	90.5	\$585-629
Wright High School	Charter	1,800	\$1,049,400.00	\$583.00	83.7	84.0	93.3	96.6	90.3	<\$584
Shelton High School	Charter	1,761	\$1,056,600.00	\$600.00	83.4	83.7	93.9	95.9	89.9	\$585-629
Holden High School	Charter	427	\$248,087.00	\$581.00	83.8	83.8	92.5	96.3	89.2	<\$584
Thomas High School	Charter	1,635	\$1,043,130.00	\$638.00	76.5	76.9	66.9	69.7	65.1	\$630-644
Bailey High School	District	4,976	\$3,124,928.00	\$628.00	77.0	81.0	66.7	81.9	54.6	\$585-629
Ford High School	District	2,739	\$1,763,916.00	\$644.00	77.1	80.7	68.3	79.3	54.3	\$630-644
Hernandez High School	District	4,635	\$3,022,020.00	\$652.00	77.3	80.9	66.8	80.9	53.5	\$645-675
Huang High School	District	2,917	\$1,910,635.00	\$655.00	76.6	81.2	65.7	81.3	53.5	\$645-675
Johnson High School	District	4,761	\$3,094,650.00	\$650.00	77.1	81.0	66.1	81.2	53.5	\$645-675
Figueroa High School	District	2,949	\$1,884,411.00	\$639.00	76.7	81.2	66.0	80.7	53.2	\$630-644
Rodriguez High School	District	3,999	\$2,547,363.00	\$637.00	76.8	80.7	66.4	80.2	53.0	\$630-644

Next up is performance for each grade at each school, in both math and reading. The math results are provided first, with the adjusted scores on the left and the original scores on the right.

Math Post-Adjustment	9th	10th	11th	12th	Math Pre-Adjustment	9th	10th	11th	12th
Bailey High School	77.1	77.0	77.5	76.5	Bailey High School	77.1	77.0	77.5	76.5
Cabrera High School	83.1	83.2	82.8	83.3	Cabrera High School	83.1	83.2	82.8	83.3
Figueroa High School	76.4	76.5	76.9	77.2	Figueroa High School	76.4	76.5	76.9	77.2
Ford High School	77.4	77.7	76.9	76.2	Ford High School	77.4	77.7	76.9	76.2
Griffin High School	82.0	84.2	83.8	83.4	Griffin High School	82.0	84.2	83.8	83.4
Hernandez High School	77.4	77.3	77.1	77.2	Hernandez High School	77.4	77.3	77.1	77.2
Holden High School	83.8	83.4	85.0	82.9	Holden High School	83.8	83.4	85.0	82.9
Huang High School	77.0	75.9	76.4	77.2	Huang High School	77.0	75.9	76.4	77.2
Johnson High School	77.2	76.7	77.5	76.9	Johnson High School	77.2	76.7	77.5	76.9
Pena High School	83.6	83.4	84.3	84.1	Pena High School	83.6	83.4	84.3	84.1
Rodriguez High School	76.9	76.6	76.4	77.7	Rodriguez High School	76.9	76.6	76.4	77.7
Shelton High School	83.4	82.9	83.4	83.8	Shelton High School	83.4	82.9	83.4	83.8
Thomas High School	59.0	83.1	83.5	83.5	Thomas High School	83.6	83.1	83.5	83.5
Wilson High School	83.1	83.7	83.2	83.0	Wilson High School	83.1	83.7	83.2	83.0
Wright High School	83.3	84.0	83.8	83.6	Wright High School	83.3	84.0	83.8	83.6

The reading results are found below and are laid out the same way as for math, with post-adjustment results on the left and original scores on the right. You will notice that the new scores for Thomas High freshmen have been adjusted to 59, as explained earlier in this report.

Reading Post-Adjustment	9th	10th	11th	12th	Reading Pre-Adjustment	9th	10th	11th	12th
Bailey High School	81.3	80.9	80.9	80.9	Bailey High School	81.3	80.9	80.9	80.9
Cabrera High School	83.7	84.3	83.8	84.3	Cabrera High School	83.7	84.3	83.8	84.3
Figueroa High School	81.2	81.4	80.6	81.4	Figueroa High School	81.2	81.4	80.6	81.4
Ford High School	80.6	81.3	80.4	80.7	Ford High School	80.6	81.3	80.4	80.7
Griffin High School	83.4	83.7	84.3	84.0	Griffin High School	83.4	83.7	84.3	84.0
Hernandez High School	80.9	80.7	81.4	80.9	Hernandez High School	80.9	80.7	81.4	80.9
Holden High School	83.7	83.3	83.8	84.7	Holden High School	83.7	83.3	83.8	84.7
Huang High School	81.3	81.5	81.4	80.3	Huang High School	81.3	81.5	81.4	80.3
Johnson High School	81.3	80.8	80.6	81.2	Johnson High School	81.3	80.8	80.6	81.2
Pena High School	83.8	83.6	84.3	84.6	Pena High School	83.8	83.6	84.3	84.6
Rodriguez High School	81.0	80.6	80.9	80.4	Rodriguez High School	81.0	80.6	80.9	80.4
Shelton High School	84.1	83.4	84.4	82.8	Shelton High School	84.1	83.4	84.4	82.8
Thomas High School	59.0	84.3	83.6	83.8	Thomas High School	83.7	84.3	83.6	83.8
Wilson High School	83.9	84.0	83.8	84.3	Wilson High School	83.9	84.0	83.8	84.3
Wright High School	83.8	83.8	84.2	84.1	Wright High School	83.8	83.8	84.2	84.1

Below is data on scores by school spending. You can see that the only level affected by the score adjustment is that for \$630-\$644, which is the one containing Thomas High School. All others remain the same.

Performance by Spending Range - Post-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Spending Ranges (Per Student)					
<\$584	83.5	83.9	93	97	90
\$585-629	81.9	83.2	87	93	81
\$630-644	76.8	79.9	67	77	56
\$645-675	77.0	81.0	66	81	54

Performance by Spending Range - Pre-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
Spending Ranges (Per Student)					
<\$584	83.5	83.9	93	97	90
\$585-629	81.9	83.2	87	93	81
\$630-644	78.5	81.6	73	84	63
\$645-675	77.0	81.0	66	81	54

Similarly, only medium sized schools (again containing Thomas) are impacted by the adjustment.

Performance by School Size - Post-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Size					
Small (<1000)	83.8	83.9	94	96	90
Medium (1000-2000)	82.0	82.5	88	91	85
Large (2000-5000)	77.7	81.3	70	83	58

Performance by School Size - Pre-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Size					
Small (<1000)	83.8	83.9	94	96	90
Medium (1000-2000)	83.4	83.9	94	97	91
Large (2000-5000)	77.7	81.3	70	83	58

Finally, in scores by school type, the adjustment of the Thomas High School scores negatively impacts the performance of the charter school category. District school results remain the same. In the charter category, math and reading scores both declined by 0.9 points. Math success (passing %) was impacted negatively by 4 percentage points, reading scores also by 4 percent, and overall success by 3 percent.

Performance by School Type - Post-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Type					
Charter	82.6	83.0	90	93	87
District	77.0	81.0	67	81	54

Performance by School Type - Pre-Thomas High School 9th Grade Adjustment

	Average Math Score	Average Reading Score	% Passing Math	% Passing Reading	% Overall Passing
School Type					
Charter	83.5	83.9	94	97	90
District	77.0	81.0	67	81	54

Thank you for the opportunity to provide this analysis. Please do not hesitate to contact me should you have any questions or require any further information.