

Python 201-Capstone Project

2014-2015 to 2016-2017 NYC Regents Report

By Enid Roman

Objective:

The New York City school system is continually changing how teachers instruct students. Are there any patterns or insights that can be drawn from looking at students' standardized test score?

I chose this particular data set because as a former PTA at my son's Junior High School and High School and also being part of the School Leadership Team, I had to provide information regarding the school's results from the regents exam to parents. As a parent I find the results of regents exam reflects not only how the student is learning but on how the teachers are teaching the students and what subjects the teachers are emphasizing.

Methodology

The following methodology was adapted to access student's performance in the Regents Exam in the NYC school year 2014-2015 to 2016-2017:

- Dataset
- Data Wrangling preprocessing and quality control are conducted.
- Data Exploration
- Summary

About the Dataset

The data set I chose was the 2014-2015 to 2016-2017 NYC Regents Report available at:

<https://data.cityofnewyork.us/Education/2014-15-To-2016-17-School-Level-NYC-Regents-Report/csps-2ne9>, from the NYCOpenData website.

You may also find more information regarding this data set at: 2014-15_To_2016-17_School_Level_NYC_Regents_Report_For_All_Variables.xlsx

The above excel sheet is provided on the same website.

I also provided High School Academic Policy Reference Guide website to reference graduation policy.

<https://k16.cuny.edu/wp-content/uploads/sites/16/2016/12/AcpolicyHighSchoolAcademicPolicyReferenceGuide.pdf>

I also provide the raw data set which is:

```
'https://raw.githubusercontent.com/CunyLaguardiaDataAnalytics/datasets/master/2014-15_To_2016-17_School_Level_NYC_Regents_Report_For_All_Variables.csv'
```

School DBN	School Name	School Level	Regents Exam	Year	Total Tested	Mean Score	Number Scoring Below 65	Percent Scoring Below 65	Number Scoring 65 or Above	Percent Scoring 65 or Above	Number Scoring 80 or Above	Percent Scoring 80 or Above	Number Scoring CR	Percent Scoring CR
1 01M034	P.S. 034 Franklin D. Roosevelt	K-8	Common Core Algebra	2017	4	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2 01M034	P.S. 034 Franklin D. Roosevelt	K-8	Living Environment	2015	16	77.9	1.0	6.3	15.0	93.8	7.0	43.8	NaN	NaN
3 01M140	P.S. 140 Nathan Straus	K-8	Common Core English	2016	9	74.0	1.0	11.1	8.0	88.9	2.0	22.2	NaN	NaN
4 01M140	P.S. 140 Nathan Straus	K-8	Common Core Algebra	2017	2	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
5 01M140	University Neighborhood High School	Secondary School	U.S. History and Government	2016	100	76.9	20	20.0	80.0	80.0	48.9	48.9	NaN	NaN
96 01M450	East Side Community School	Secondary School	Common Core Algebra	2016	9	78.2	2.0	22.2	7.0	77.8	6.0	66.7	7.0	77.8
98 01M450	East Side Community School	Secondary School	Common Core English	2016	182	82.2	11.0	6.0	171.0	94.0	132.0	72.5	151.0	83.0
99 01M450	East Side Community School	Secondary School	Common Core English	2017	109	79.7	8.0	7.3	101.0	92.7	65.0	59.6	79.0	72.5

Observation:

This data set contain 212,331 rows and 15 columns.

The data set contains each school by borough with the total count of students that had taken the Regents Exam for each year (2015, 2016, and 2017). Which was broken down into how many students had scored below 65, scored 65 or above, and scored 80 or above and their percentile. It also contains the average scores for each exam.

The data set needed a lot of cleaning. There were alot of missing values that were replaced by “s” and “na”. I had to drop rows with missing values and remove columns that I was not going to used in my analysis. The count for column scored 65 or above also included count of scored 80 or above. Numbers were float instead of integers.

Data Wrangling:

- The Python libraries I imported and used was Panda, Numpy, Seaborn, Matplotlib, Math, RegEx, and ProfileReport.
- I used dataframe.shape to get the total number of rows and columns.
- I used the Profile Report (pp.profilereport(df)) to get a complete information on the data. This report gave me an exploratory data analysis with just a few lines of codes. I was able to use this report for my data cleaning and analysis.



● Data Cleaning:

- I did a `df.dropna()` to remove the rows that have `NaN` because it had missing info.
- I used `dataframe.head()` to observe the data set. I observed the missing values “`s`” and “`na`” in the data set. I then replaced the missing values with `NaN` to make it easier to replace all the missing value into numbers so I wouldn’t have problem with my analysis and graphings.
- I used `na_values=missing` value to replace the missing values with `NaN`.
- I did a `df.columns` to see the names of the columns.
- I used `df.drop` to drop the columns that I didn’t need.
- I did a `df.info()`. This gives me the total columns the data has, how many rows and data type.
- I did a `m=(df.types=='float')` `df.loc()[:,m]=df.loc[:,m].astype(int)` to change the numbers that were float to integers.
- I did a `df [new column_name]=[use column_name subtract from]-[old column_name]` to create a new column with the difference of the 2 columns. I did this because I noticed the Number Scoring 65 or Above was included in the Number Scoring 80 or Above so I had to subtract them both and create a new column with the correct count.
- I dropped the old column and rearranged the columns in their proper order by renaming the data frame, `df=df[" "]`.

Data Exploration

- I did a `df.describe()` function to compute a summary of statistics pertaining to the Dataframe columns. This function gives the average, std and IQR values.
- I also did a `df.groupby.describe()` of the Average Score of each Regents Exam per year. This gives me the statistic for each Regents per year.
- With a `pd.set_option()` I was able to set the numbers at 2 decimal place for both analysis.
- I did a graph using the `df.his()` function which give me a measurement of each variables from the columns.
- I did a `df['Year'].min()` and `df['Year'].max` to get the beginning start year and end year of regents taken. Which it was from 2015 to 2016.
- I did a `df.groupby.sum()` to find the sum of number scoring below 65, scoring 65 to 79, and scoring 80 or above and the average score for Regents Exam by Year and By school. This gives me a more detail information of how many students scored below 65, 65 to 79, and 80 or above for each regents exam, for each year 2015 to 2017 by each school in the 5 boroughs. (Please see Python 201-Capstone Project in Github. To long to show)
- I did a `df.groupby.sum()` of total tested and total number scoring below 65, 65 to 79, and 80 or above for each regents by year. I also did 2 different graphs.
- I did a `df.groupby.mean()` of total number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year 2015, 2016, and 2017. I also did 2 different graphs.
- I did a `df.groupby.sum()` of total number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year. I also did a bar graph.
- I did a `sns.barplot` graph with the mean score, regents exam by year.

2015 Global History had the most students scoring below 65 with 190,173 students, while Global History and Geography had the most students scoring 65 to 79 with 349,582 students and U.S. History and Government had the most students scoring 80 or above with 175,769 students.

2016 Global History and Geography had the most students scoring below with 194,121 students, while Common Core Algebra had the most students scoring 65 to 79 with 433,696 students and Common Core English had the most students scoring 80 or above with 197,585 students.

2017 Common Core Algebra had the most students scoring below 65 with 184,346 students, while Common Core Algebra had the most scoring 65 to 79 with 439,759 students and Common Core English had the most students scoring 80 or above with 216,979 students.

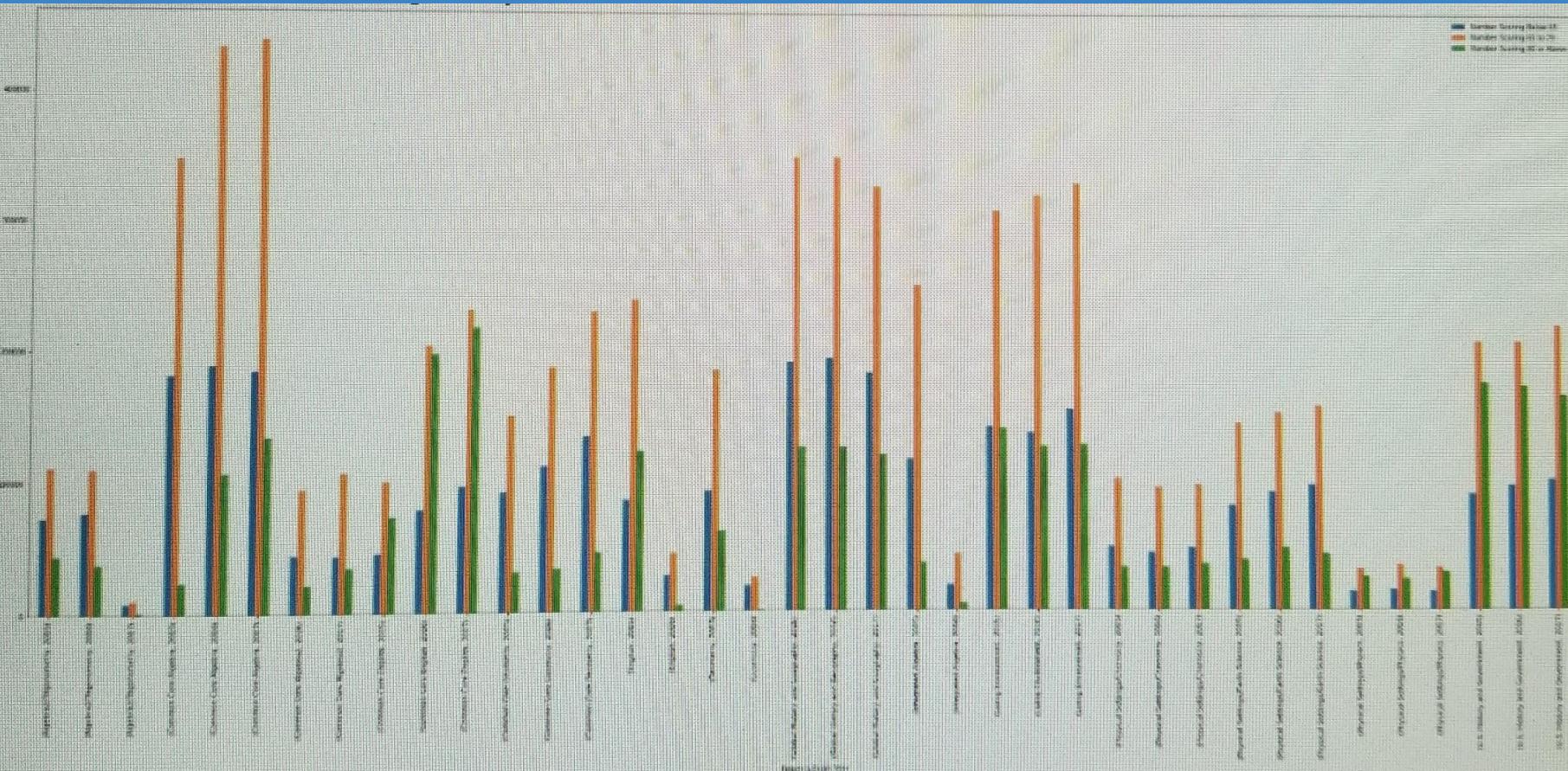
Total tested and total number scoring below 65, 65 to 79, and 80 or above for each regents by year

Regents Exam	Year	Total Tested	Number Scoring Below 65	Number Scoring 65 to 79	Number Scoring 80 or Above
Algebra2/Trigonometry	2015	154550	72747	110915	43635
	2016	148130	76596	110262	37868
	2017	11440	8168	10321	1119
Common Core Algebra	2015	371487	181373	348085	23402
	2016	540207	189247	433696	106511
	2017	573065	184346	439759	133306
Common Core Algebra2	2016	115249	43954	93975	21274
	2017	140308	43427	106202	34106
Common Core English	2015	172902	44708	100135	72767
	2016	401403	78275	203818	197585
	2017	448519	95904	231540	216979
Common Core Geometry	2015	180624	91641	149884	30740
	2016	220310	110876	187385	32925
	2017	275179	133229	230314	44865
English	2015	361246	85058	239274	121972
	2016	49256	27657	44676	4580
Geometry	2015	245168	91786	184052	61116
	2016	26694	19493	25712	982
Global History and Geography	2015	474661	190173	349582	125079
	2016	474164	194121	349599	124565
	2017	446021	181801	326856	119165
Integrated Algebra	2015	286221	115494	249968	36253
	2016	47936	19351	42538	5398
Living Environment	2015	447877	139927	308318	139559

Total tested and total number scoring below 65, 65 to 79, and 80 or above for each regents by year

	2016	47936	19351	42538	5398
Living Environment	2015	447877	139927	308318	139559
	2016	446284	135403	320784	125500
	2017	456569	154176	329893	126676
Physical Settings/Chemistry	2015	134057	48454	101294	32763
	2016	126189	43794	93428	32761
	2017	131245	47346	95746	35499
Physical Settings/Earth Science	2015	182743	80249	144076	38667
	2016	199178	90678	151306	47872
	2017	199721	96789	156861	42860
Physical Settings/Physics	2015	57037	14205	31128	25909
	2016	58814	15633	34570	24244
	2017	61972	14254	32685	29287
U.S. History and Government	2015	382482	89470	206713	175769
	2016	380651	95683	207582	173069
	2017	384812	101197	219822	164990

Total tested and total number scoring below 65, 65 to 79, and 80 or above for each regents by year.



From 2015 to 2017 more students have taken more Common Core Regents and Earth Science Regents and more students were passing these exams. Keep in mind to pass these exam with a 65 and above is a requirement to graduate with with a Regents diploma.

From 2015 to 2016 less students have taken the more Advanced Regents exams and passed them. Which means there were less students graduating with Advanced Regents Diploma.

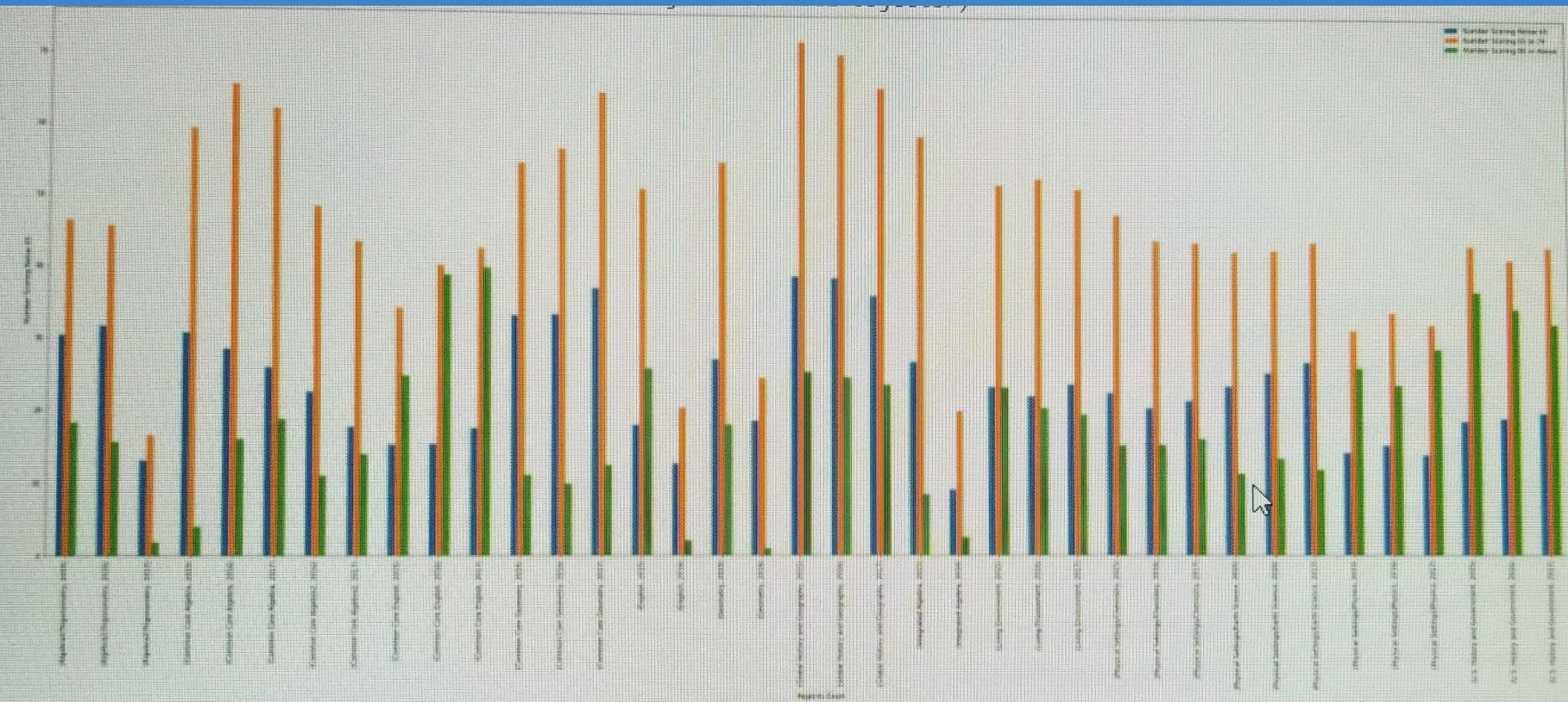
Total average number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year 2015, 2016, and 2017

Regents Exam	Year	Total Tested	Number Scoring Below 65	Number Scoring 65 to 79	Number Scoring 80 or Above
Algebra2/Trigonometry	2015	64.61	30.41	46.37	18.24
	2016	61.31	31.70	45.64	15.67
	2017	18.33	13.09	16.54	1.79
Common Core Algebra	2015	63.29	30.90	59.30	3.99
	2016	81.71	28.63	65.60	16.11
	2017	81.08	26.08	62.22	18.86
Common Core Algebra2	2016	59.65	22.75	48.64	11.01
	2017	57.84	17.90	43.78	14.06
Common Core English	2015	59.58	15.41	34.51	25.07
	2016	79.82	15.56	40.53	39.29
	2017	83.24	17.80	42.97	40.27
Common Core Geometry	2015	66.33	33.65	55.04	11.29
	2016	67.17	33.80	57.13	10.04
	2017	77.67	37.60	65.01	12.66
English	2015	77.91	18.34	51.60	26.30
	2016	22.94	12.88	20.81	2.13
Geometry	2015	73.85	27.65	55.44	18.41
	2016	25.99	18.98	25.04	0.96
Global History and Geography	2015	98.46	39.45	72.51	25.19
	2016	95.89	39.26	70.70	24.09
	2017	90.16	36.75	66.07	8.59
Integrated Algebra	2015	67.79	27.36	59.21	2.59
	2016	22.98	9.28	20.39	23.75
Living Environment	2015	76.21	23.81	52.46	20.80
	2016	76.21	23.81	52.46	20.80

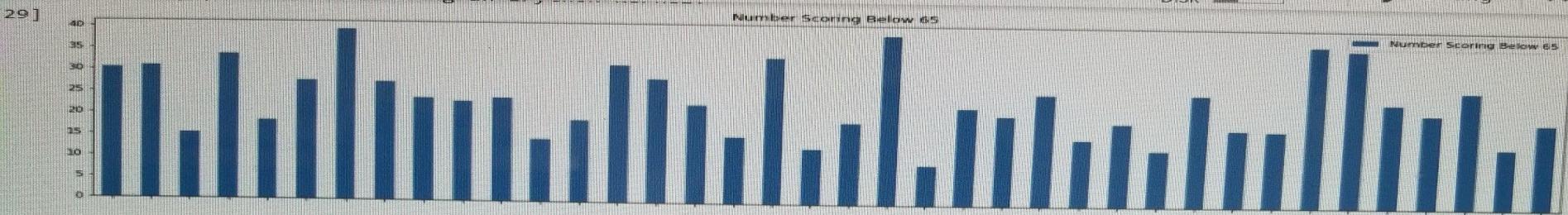
Total average number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year 2015, 2016, and 2017

	2016	74.29	22.54	53.40	20.89
	2017	71.80	24.25	51.88	19.92
Physical Settings/Chemistry	2015	63.78	23.05	48.19	15.59
	2016	60.18	20.88	44.55	15.62
	2017	60.73	21.91	44.31	16.43
Physical Settings/Earth Science	2015	54.58	23.97	43.03	11.55
	2016	56.79	25.86	43.14	13.65
	2017	56.39	27.33	44.29	12.10
Physical Settings/Physics	2015	58.26	14.51	31.80	26.46
	2016	58.35	15.51	34.30	24.05
	2017	61.60	14.17	32.49	29.11
U.S. History and Government	2015	80.86	18.92	43.70	37.16
	2016	76.56	19.24	41.75	34.81
	2017	76.20	20.04	43.53	32.67

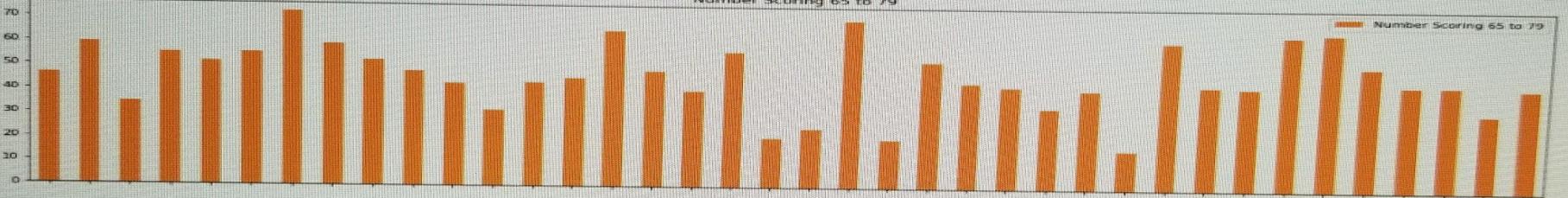
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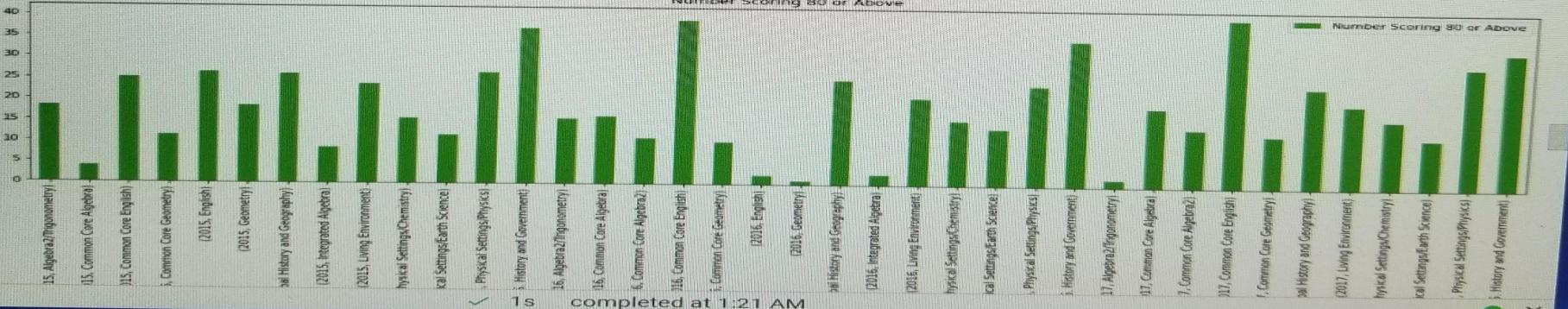
Total average number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year 2015, 2016, and 2017



Number Scoring 65 to 79



Number Scoring 80 or Above



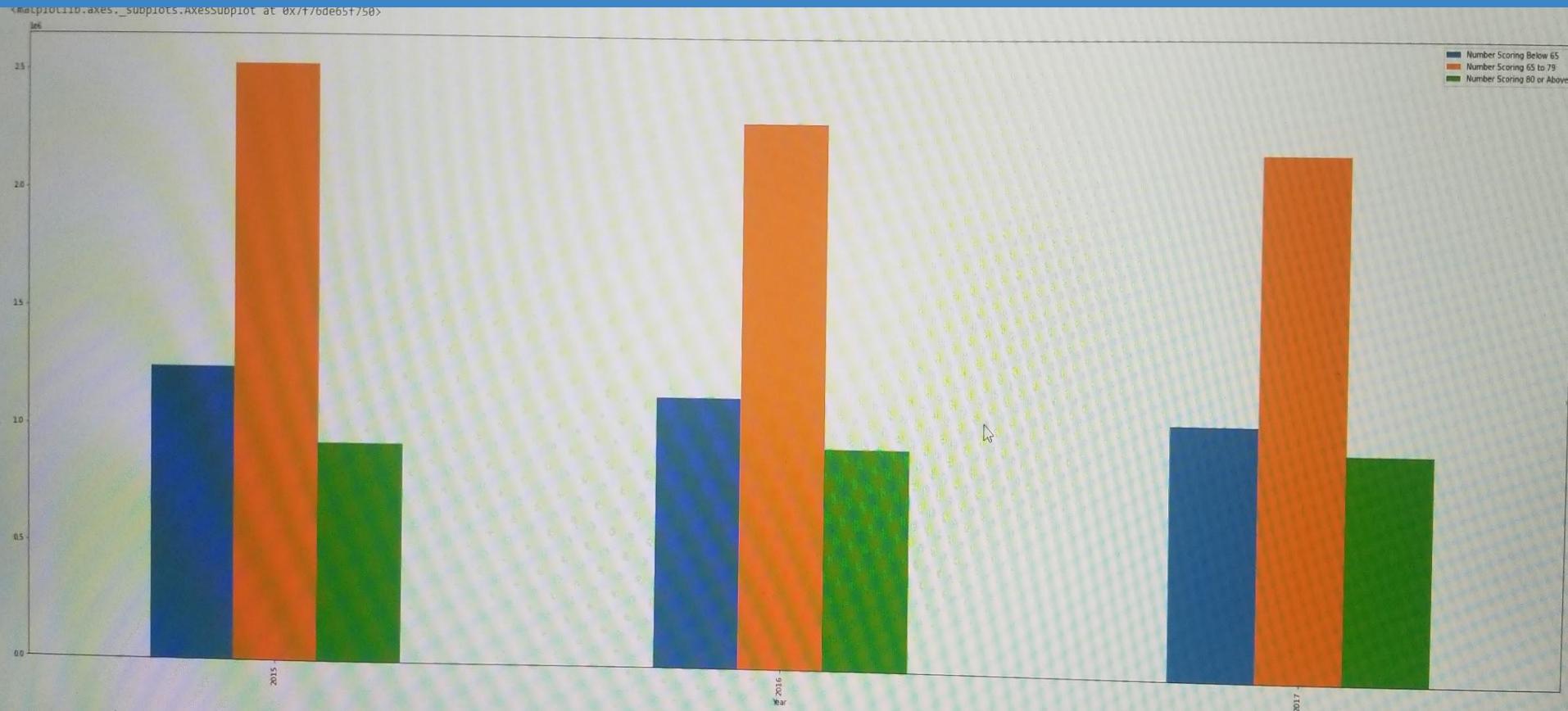
I observed that all 3 years more students scored 65 to 79.

Even though most students scored 65 to 79, I noticed each year students scoring 65 to 79 dropped approximately 224,000 in 2016 and approximately 119,000 in 2017 and the scoring for 80 or above had increased by approximately 10,000 each year and scoring below 65 had decreased approximately 100,000 each year. But also keep in mind that total tested dropped approximately give or take 150,000 each year.

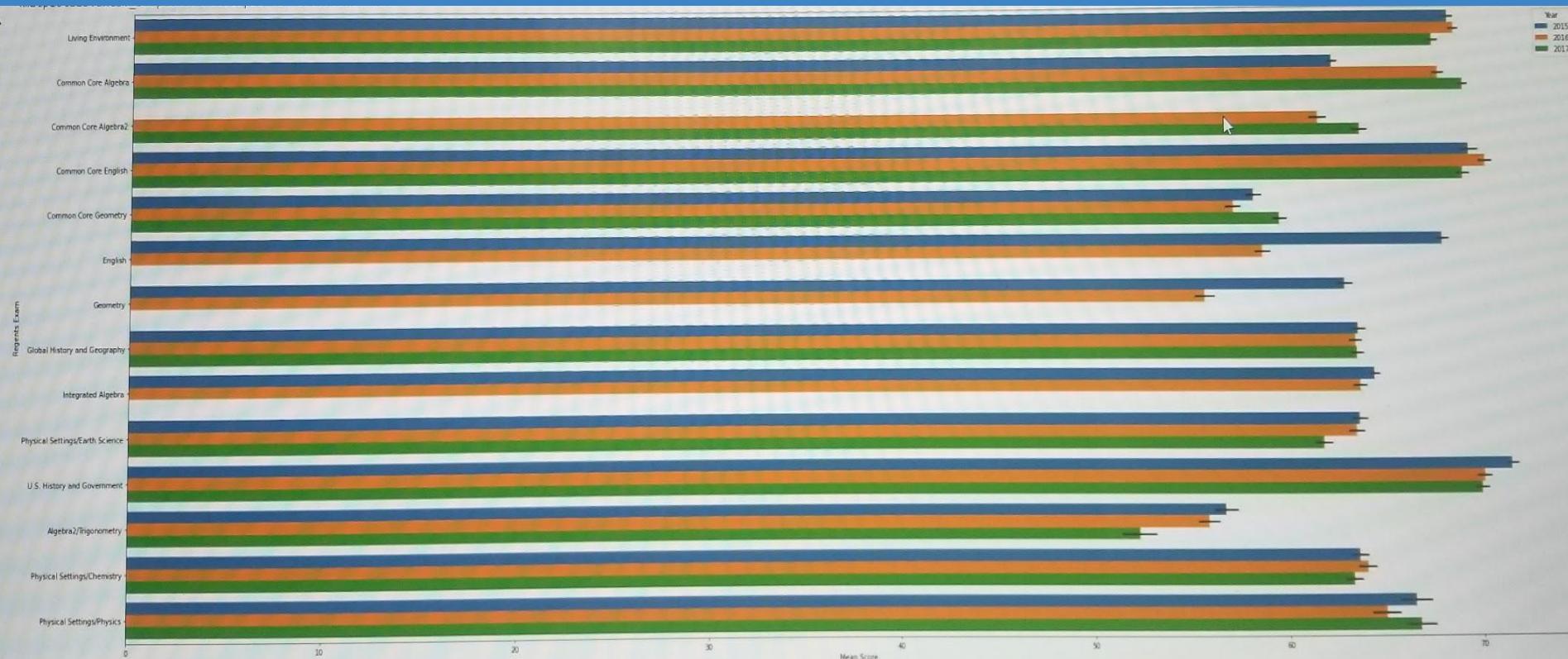
**Total number of student tested, number scoring below 65, 65 to 79, and 80 or above
by each year**

Year	Total Tested	Number Scoring Below 65	Number Scoring 65 to 79	Number Scoring 80 or Above
2015	3451055	1245285	2523424	927631
2016	3234465	1140761	2299331	935134
2017	3128851	1060637	2179999	948852

Total number of student tested, number scoring below 65, 65 to 79, and 80 or above by each year



In this graph I'm showing a comparison with the average regents scores for each regents by year. U.S. History and Government has the highest average of 75 in 2015, which then dropped to 70 by 2017. The lowest is Algebra 2/Trigonometry with 53 in 2017, which was 57 in 2015.



A photograph showing a group of students in graduation attire. They are wearing dark blue caps and gowns, and are holding white diplomas with red tassels. The students are looking towards the camera with varying expressions of pride and accomplishment.

Conclusion

Results of the Regents Exams are used not only for student high school graduation requirements, but for school quality reports, and teacher development and evaluation. Based on the regents results in 2015 to 2017 I observe by looking at the numbers and graphing teachers have been concentrating in getting the students prepared for the basics, like Common Core Algebra, Common Core English, Living Environment, U.S. History and Government, and Global History and Geography, so they could earn their required Regents Diploma as long as they got a 65+. Advanced regents were left as an optional for those students that wanted to earn an Advanced Regents Diploma.