

# The boys are not alright

Unsupervised Machine Learning for  
Capacity Building

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# INTRODUCTION AND PROBLEM STATEMENT

SECTIONS Thursday, May 20, 2021

INQUIRER.NET

TODAY'S PAPER |

ADLINES



## More women in HS, college than men in PH, says report

only are girls enrolled at a higher rate, there are also data that appear to suggest they are outperforming boys in school

Matthew Reysio-Cruz - Reporter / @inquirerdotnet Philippine Daily Inquirer / 04:56 AM December 27, 2019

MANILA, Philippines — Filipino women are enrolled in high school and college at significantly higher rates than men, according to an annual report that measures gender equality in 153 countries.

The 2020 Global Gender Gap Report of the World Bank found that 71.3 percent of women are enrolled in high school, compared to only 40.4 percent in college, compared to only 39.8 percent among men.

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DISCUSSION PAPER SERIES NO. 2019-01

### Gender Equity in Education: Helping the Boys Catch Up

Vicente B. Paqueo and Aniceto C. Orbeta Jr.

EDITION: **Table 2. Non-enrollees among high school-age 12 to 15 population by region, income quintile, and sex in 2014 (in thousands)**

By region and sex

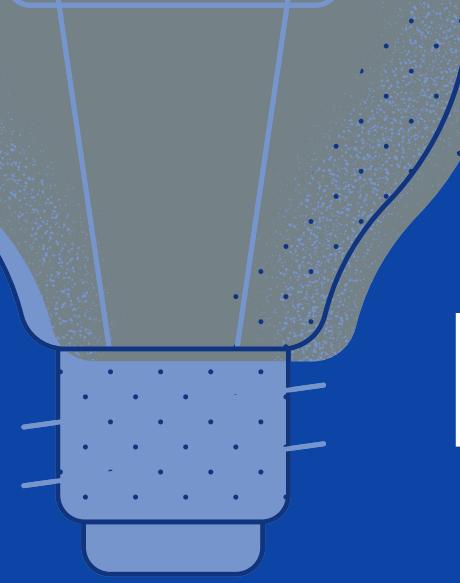
	Male	Female	Total
National Capital Region	25.44	23.75	49.18
Cordillera Autonomous Region	8.98	3.20	12.18
1	18.02	6.29	24.30
2	12.75	1.51	14.26
3	46.57	21.04	67.60
4	37.46	24.02	61.48
5	12.42	6.49	18.91
6	30.33	16.85	47.18
7	22.27	12.60	34.87

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# TOWARDS BUILDING A STRATEGY TO KEEP FILIPINO BOYS IN SCHOOL

Reports consistently show  
that Filipino boys are  
dropping out of school



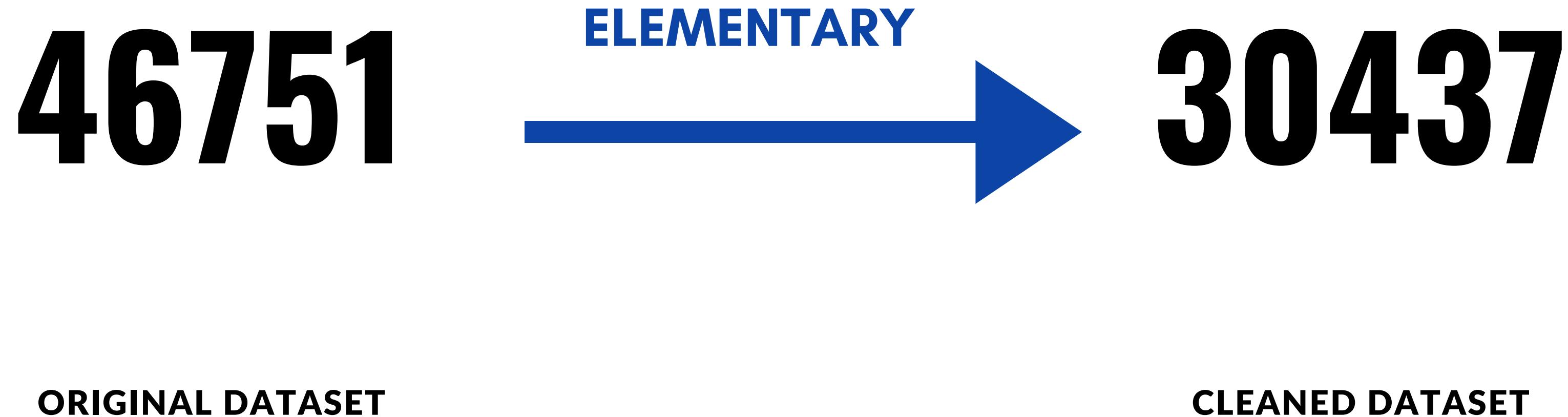
# DATA USED

A group of datasets from the Department of Education that is comprised of information from **2015** about the public schools around the country including their general enrollment rates, number of SPED students and budgets allocations.

# TOOLS AND PROCESSES

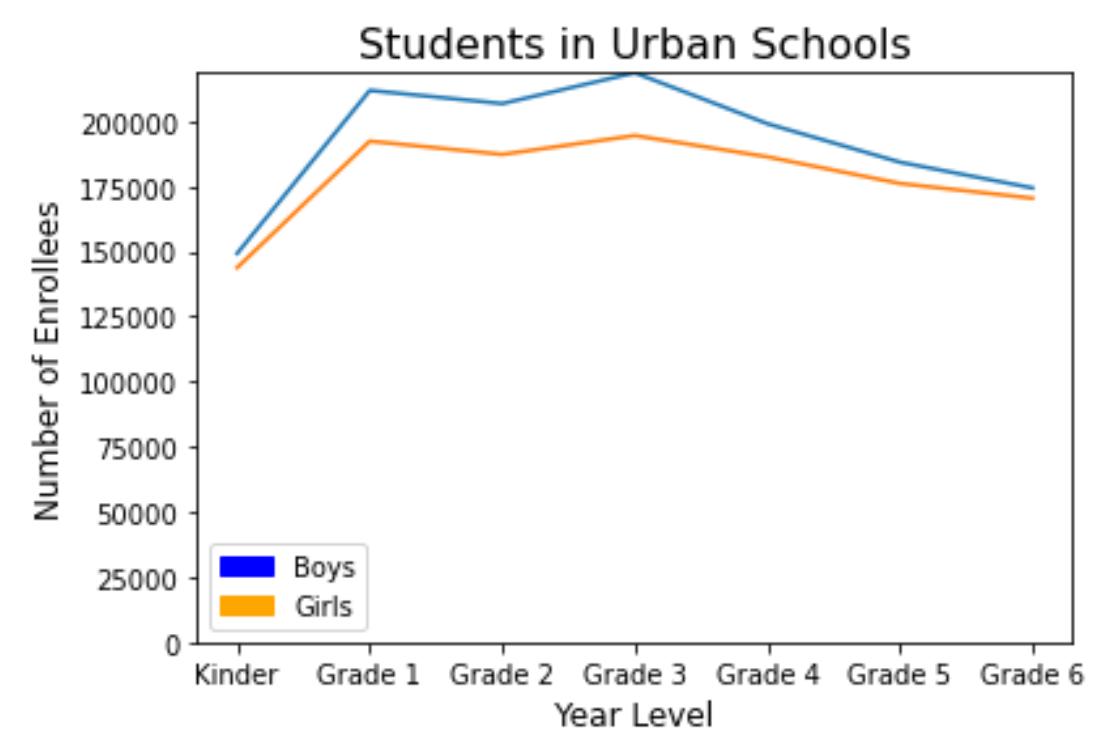
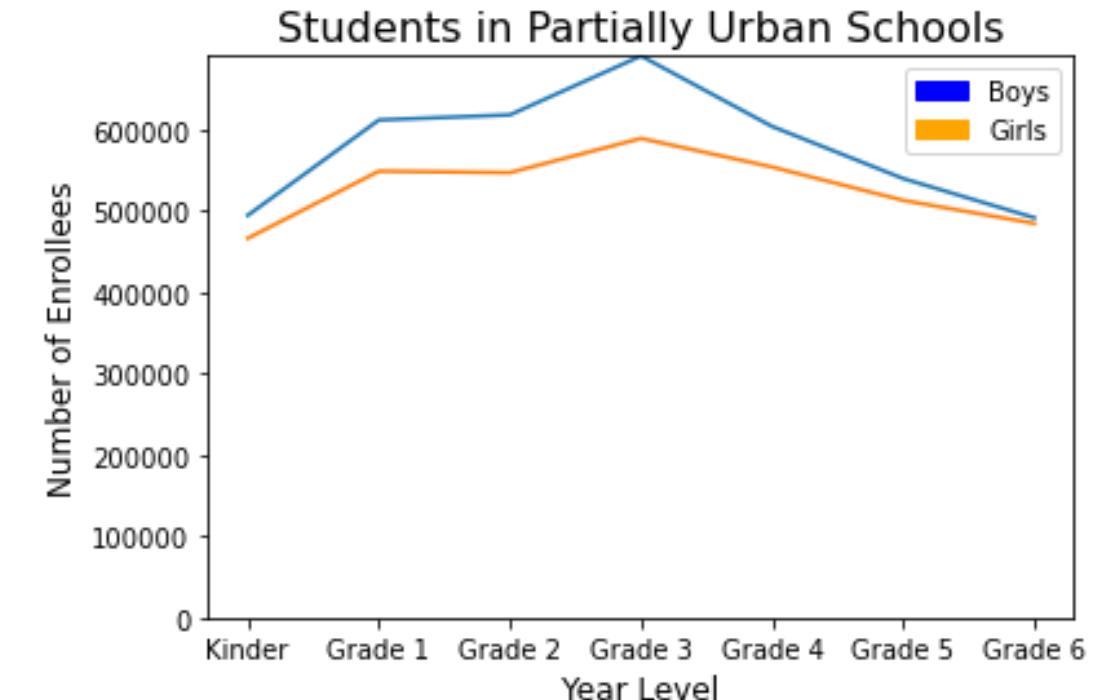
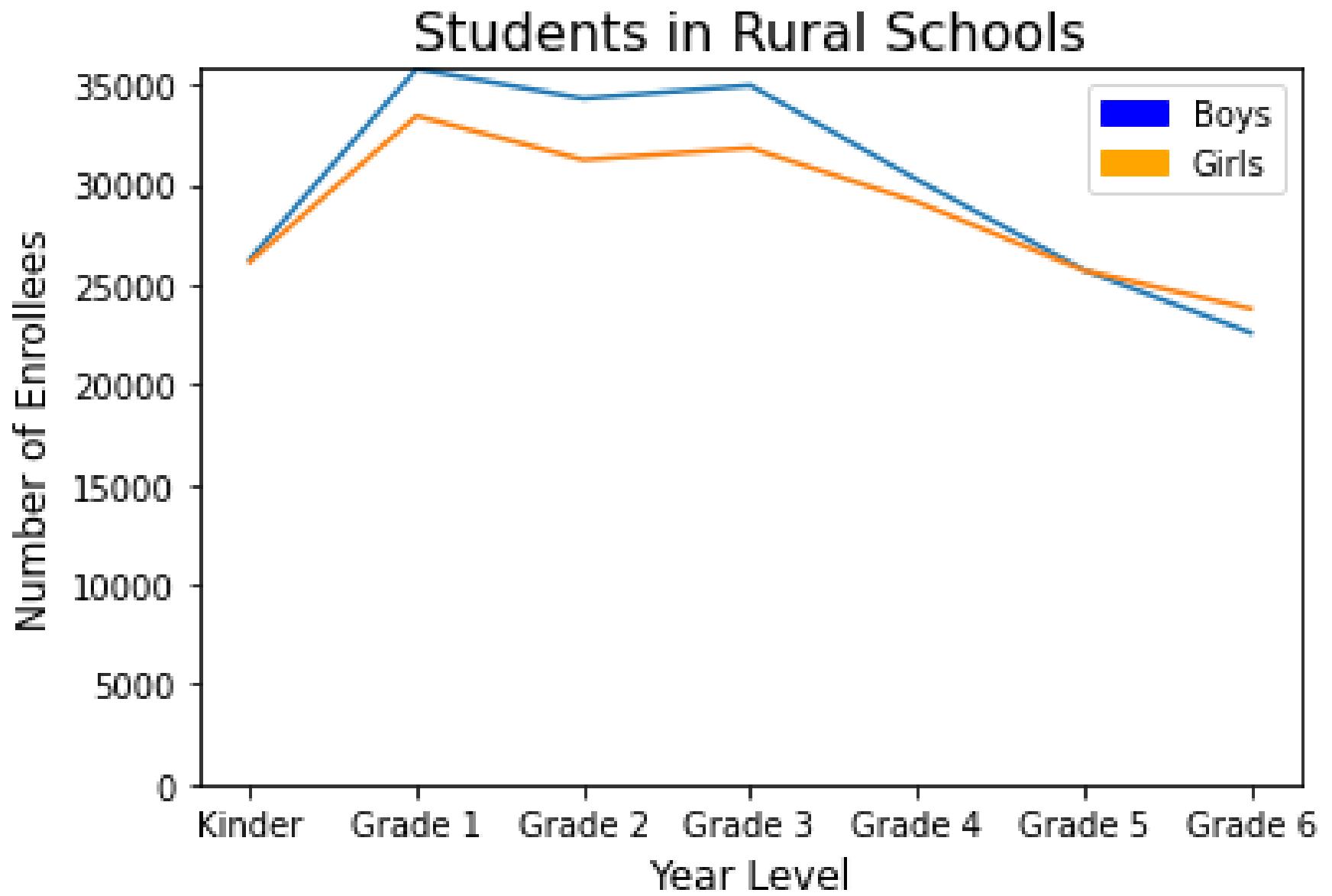


# DATA CLEANING



# OVERARCHING OBJECTIVE

Be able to use **cluster analysis** in order to group schools with **similar capacity metrics** to determine a capacity building strategy for each specific cluster

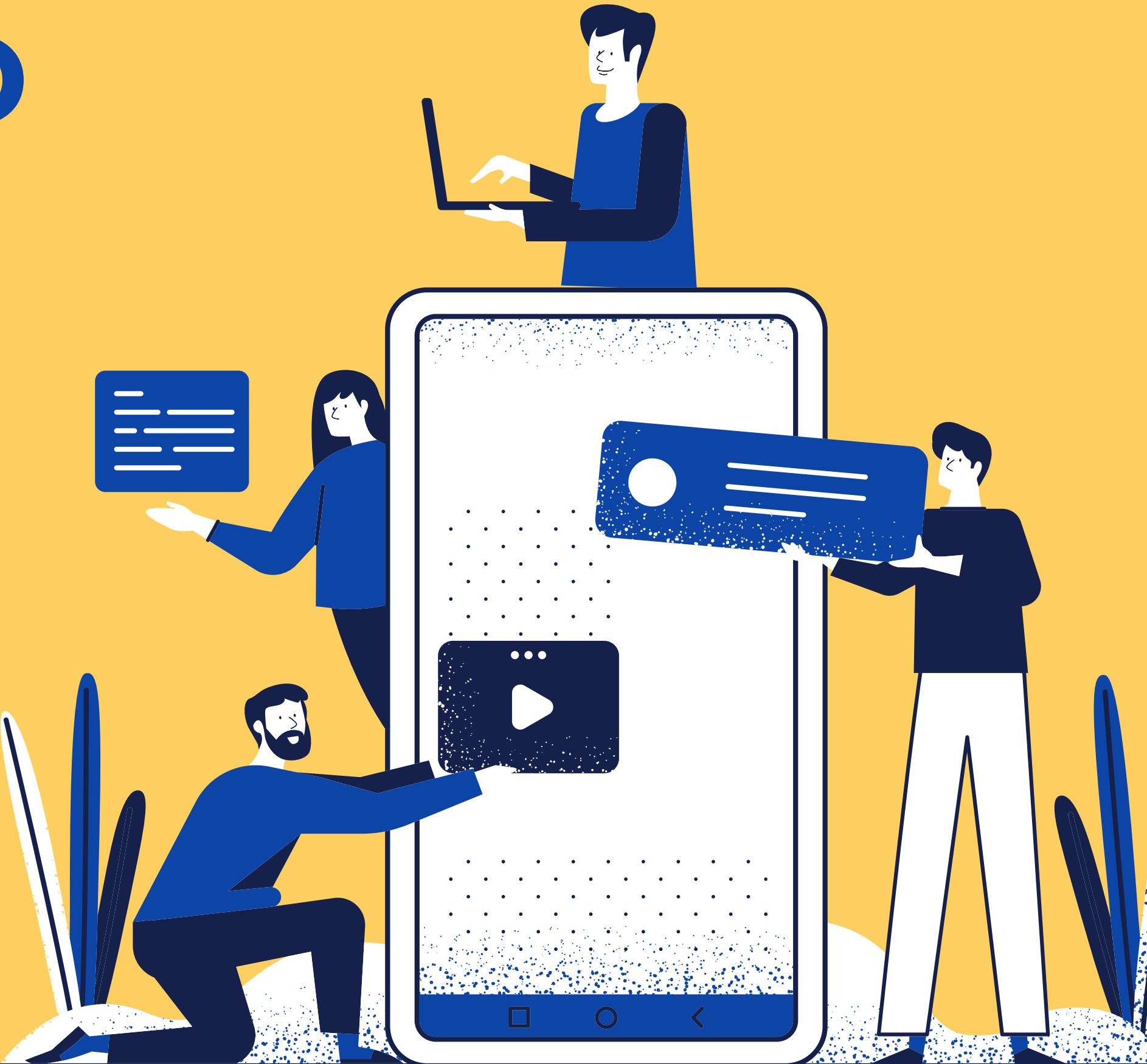


IN ALL THREE CASES, WE CAN  
HYPOTHESIZE THAT IT **BOYS ARE MORE  
LIKELY TO NOT FINISH ELEMENTARY  
SCHOOL**

**THE CASE IS MORE PROFOUND IN  
RURAL SCHOOLS**



# UNSUPERVISED MACHINE LEARNING



# MODELLING

K Means



# FEATURES

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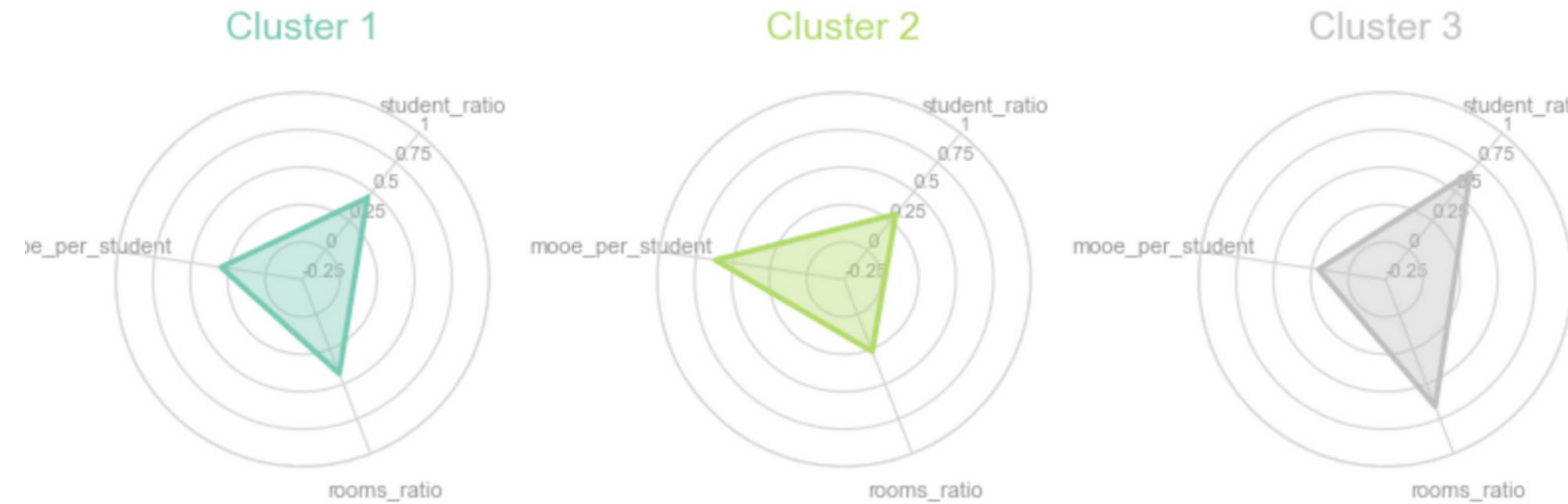
**1** STUDENT-RATIO

**2** ROOM-RATIO

**3** MOOE PER STUDENT

# K-MEANS CLUSTERING

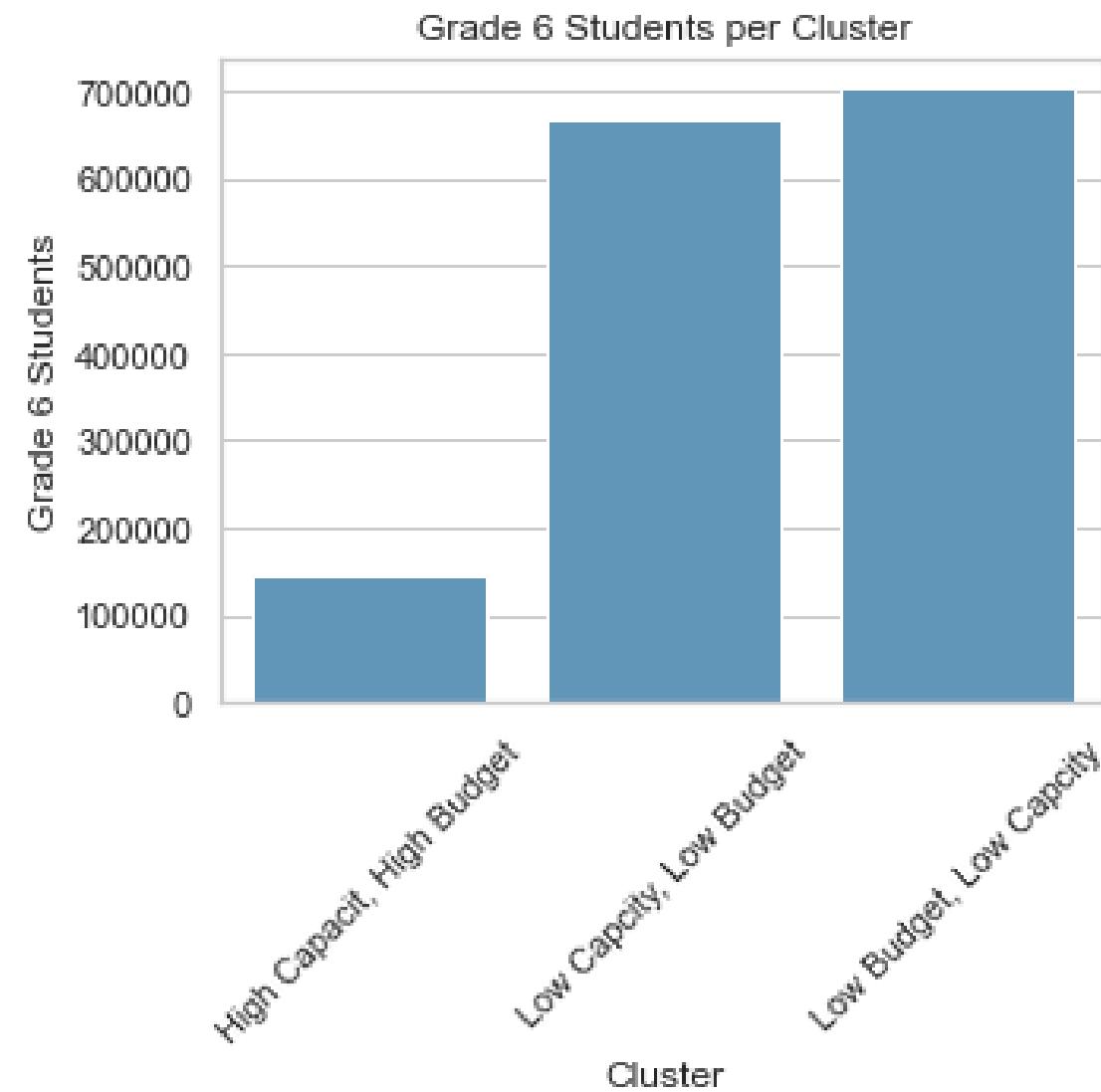
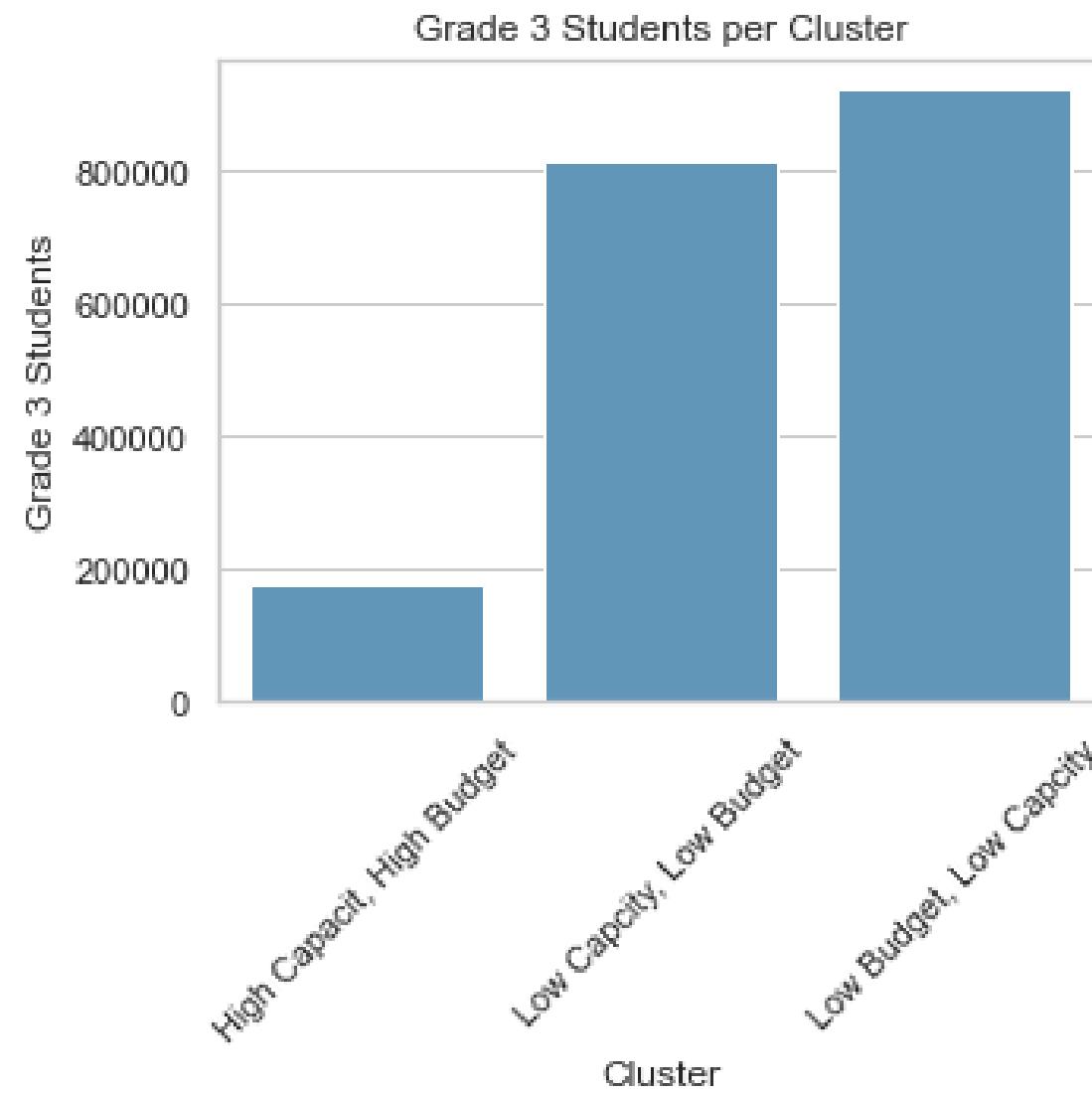
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Cluster Label	Student / Teacher	Student / Room	MOOE / Student	No. of Schools
High Capacity, High Budget Expense (Cluster 1)	Low	Low	High	7,890
High Capacity, Low Budget (Cluster 2)	Low	Low	Low	8,812
Low Capacity, Low Budget (Cluster 3)	High	High	Low	13,735

# IS CAPACITY AND BUDGET A FACTOR IN TOTAL ENROLLMENT?

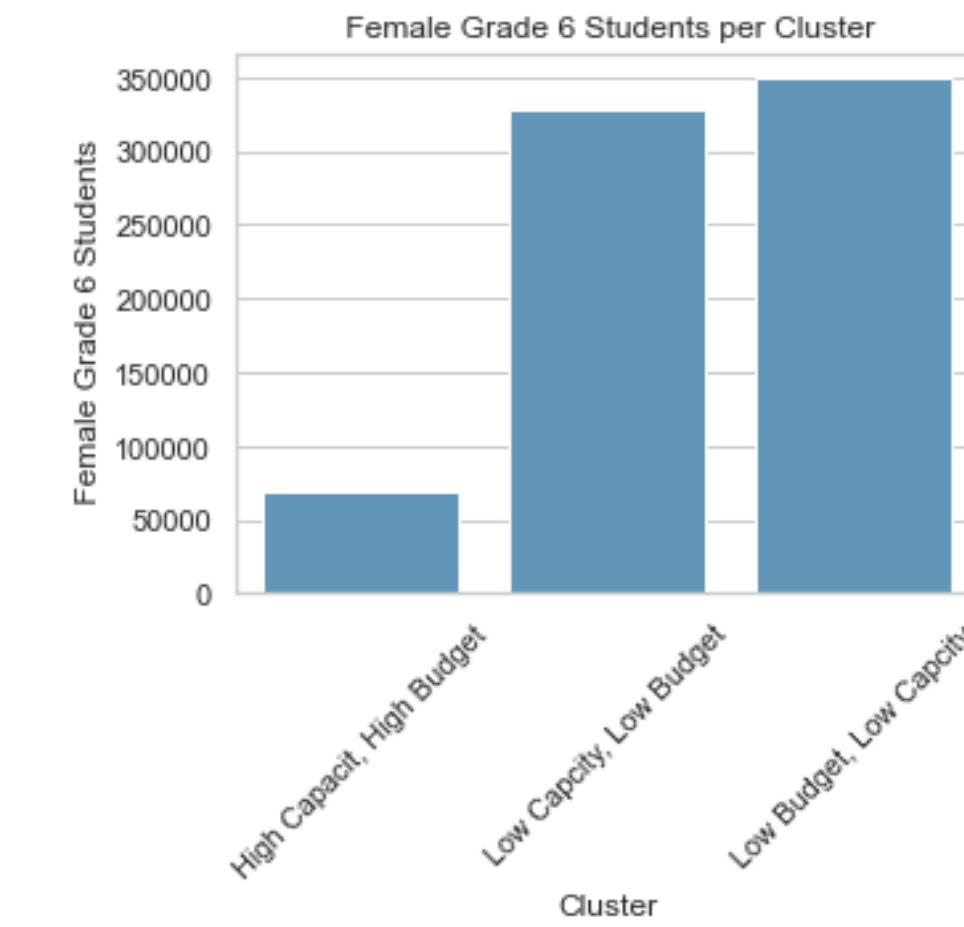
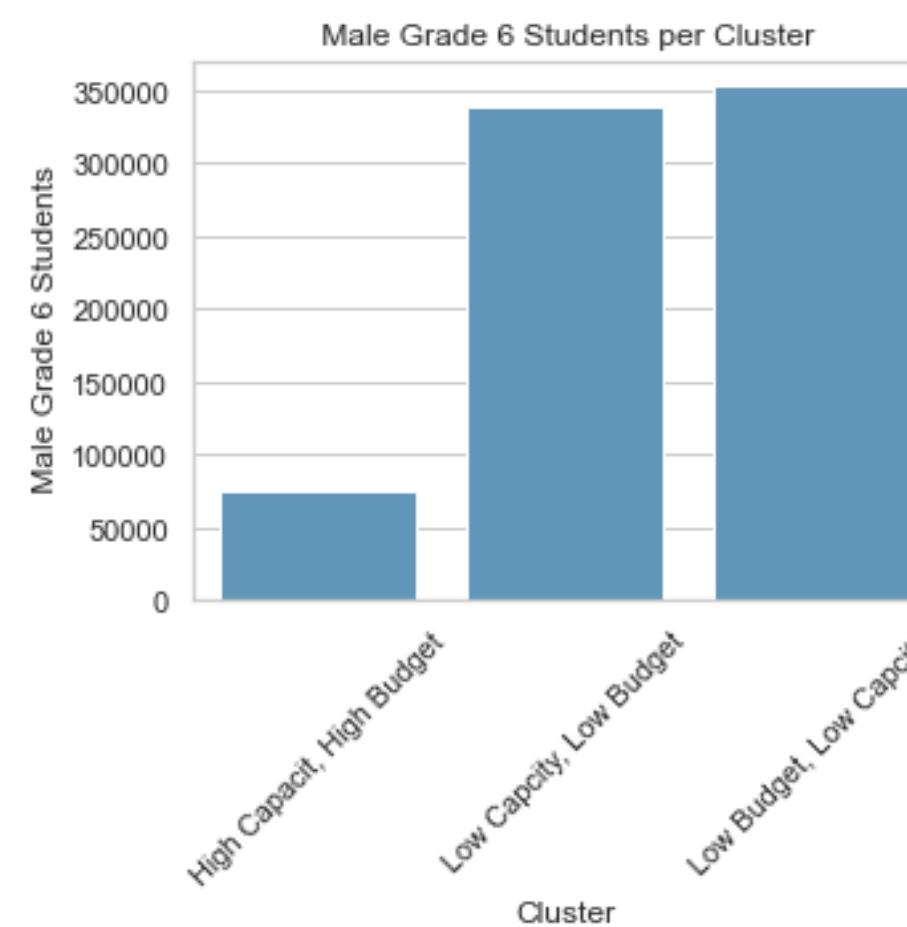
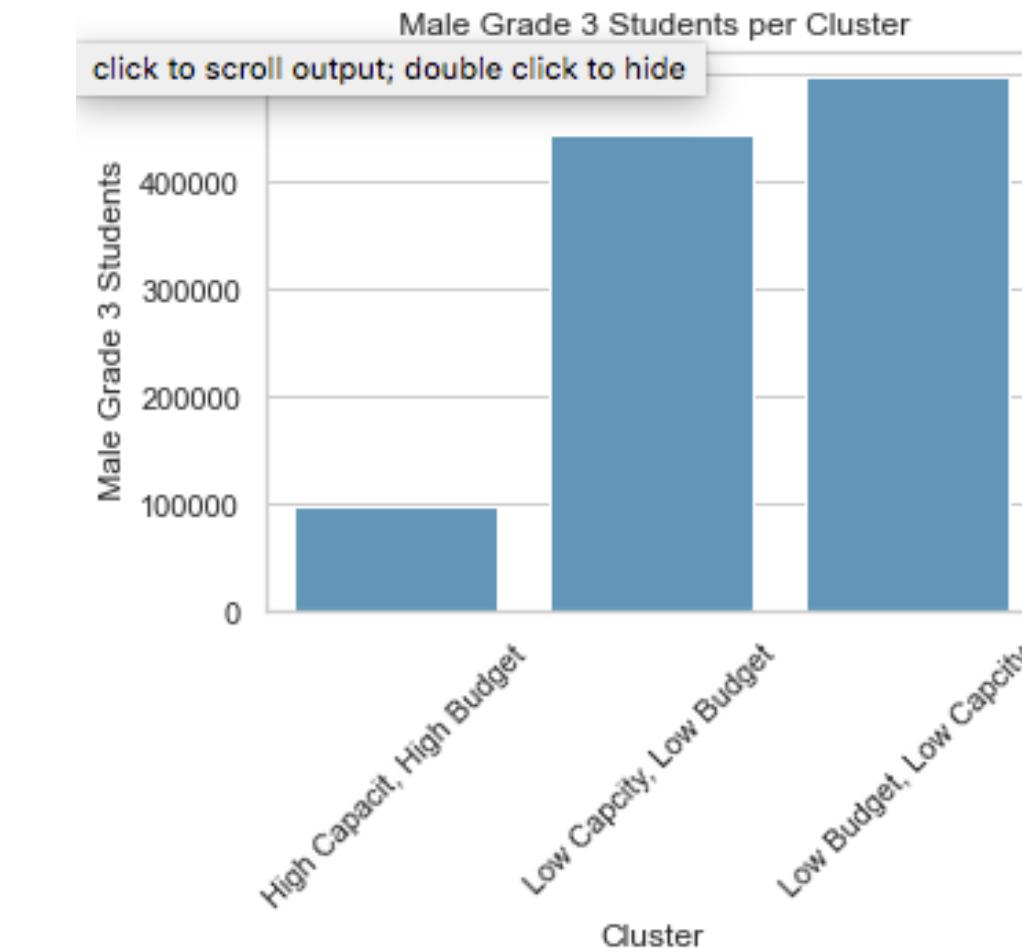
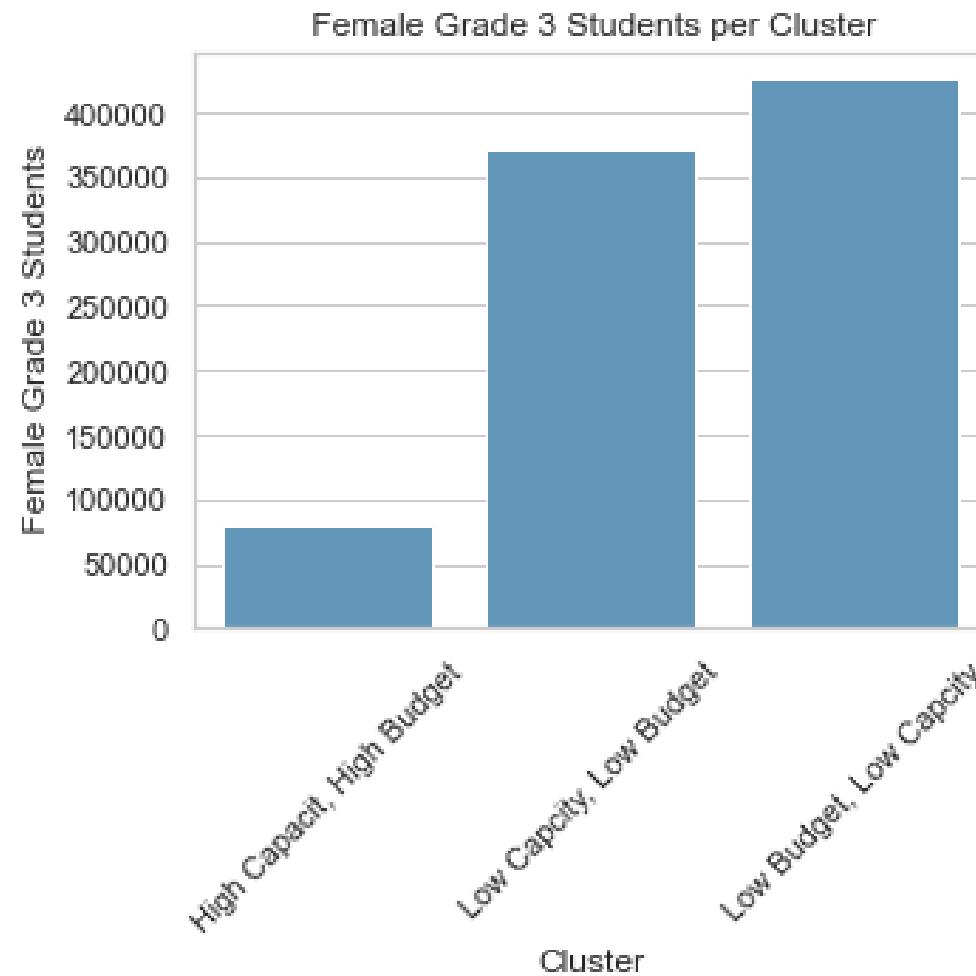
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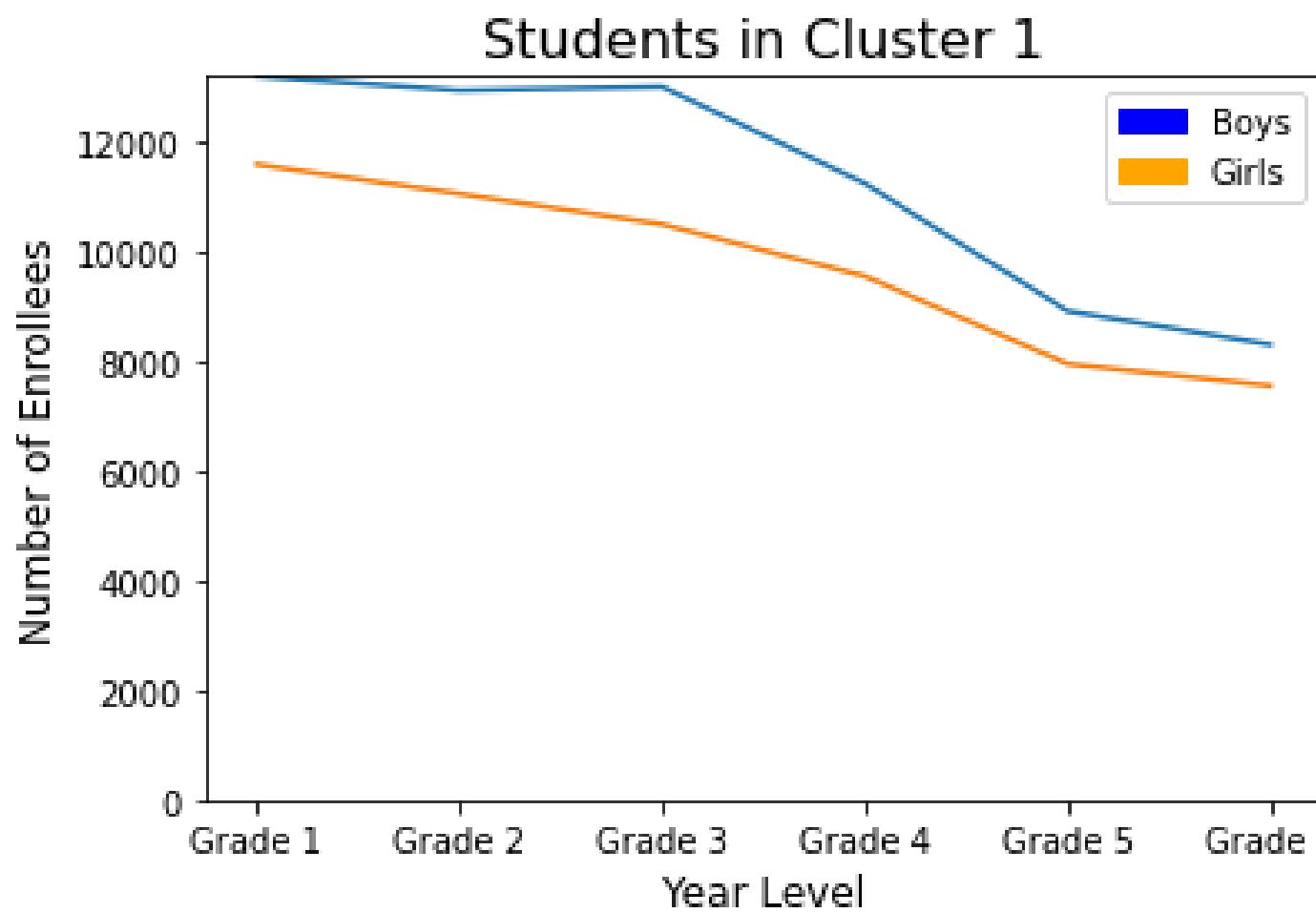
**% PERCENTAGE OF STUDENTS PER CLUSTER ARE VERY SIMILAR FOR ALL CLUSTERS**

**CAPACITY AND BUDGET ARE NOT A FACTOR ON WHY ENROLLMENT HAS BEEN DECREASING**

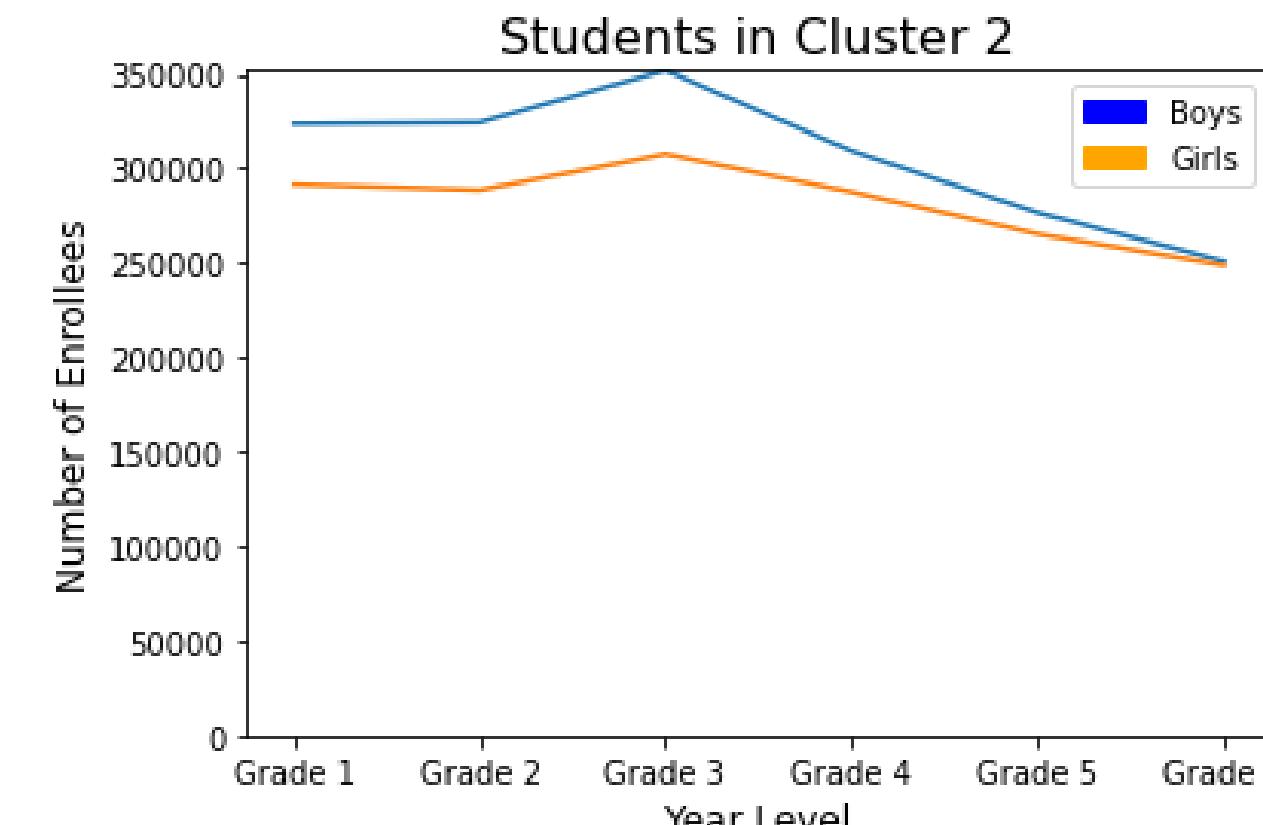
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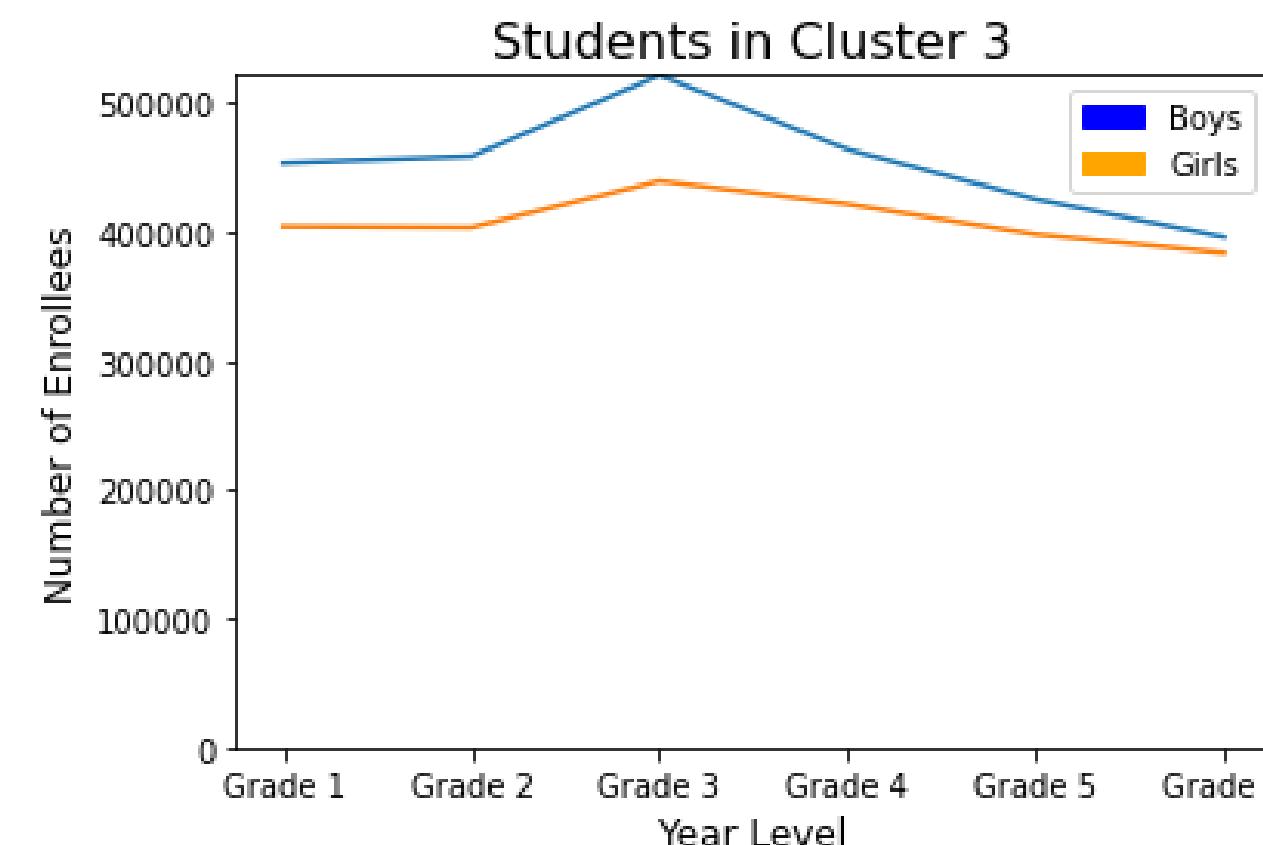
# GOING BACK TO THE BOYS



average drop between male and female is not statistically significant\* (80% vs 79%), but overall average drop is higher than the other clusters



Statistically significant drop (80%) from girls (84%)\*



Statistically significant drop (101%) from girls (93%)\*, but overall drop is lower than other clusters

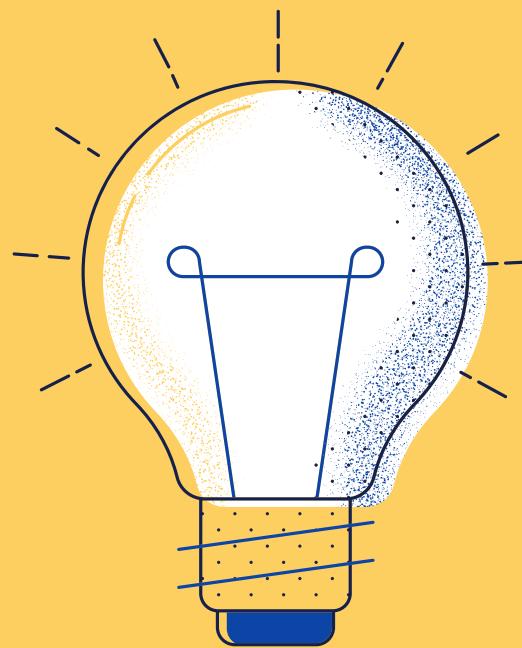
\*at 95% Confidence Level



**NOW THAT...**

We have clustered the schools with similar capacity metrics, how do we use these to determine future strategies?

## CONCLUSIONS AND RECOMMENDATION



### NO ONE LEFT BEHIND!

- Consider creating more programs for boys and girls to encourage finishing schools specifically for Cluster 1

### TAKE A LOOK BACK!

- Review the school allocation especially those in Cluster 3

### WE CAN DO MORE!

- Hierarchical Clustering
- Other datasets (e.g. for Dropout rates)



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# Q&A