

"An excellent
account of one of
the most dramatic
and moving events
of the century."

—SIR ROGER

PENROSE, *NEW YORK*

TIMES BOOK REVIEW



YOU'RE HIRED!

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PROBLEM STATEMENT

The incoming sophomore class will have 140 more students than the graduating senior class. To accommodate this increase, seven new faculty will be hired. The problem on campus is:

Which departments should get the extra teachers?

HYPOTHESIS

The department with the greatest teacher to student ratio should be considered first when hiring new faculty.

ASSUMPTIONS

- All teachers will teach year round
- Teachers will teach the whole day
- Each foreign language teacher teaches only one language
- An equal percentage of the students in a class drop out each year.
- The ideal (student : teacher) ratio is 100 : 1.
- Teachers can teach all grade levels.
- Proportion of students of a certain year in a certain class (i.e. % of 9th graders taking Biology) remains constant.

ANALYSIS

- The problem can be divided into cases by year
 - I.e. 2021-2022
- Increased attendance --> Higher (Student : Teacher) Ratio
- Lower (S:T) Ratio --> More one-on-one interaction --> Better education
- Get (S:T) near 100 for as many classes as possible.
- Why 100?
 - 5 Teaching Blocks per day (6 Periods – 1 Prep)
 - $100/5 = 20$ Students per Class

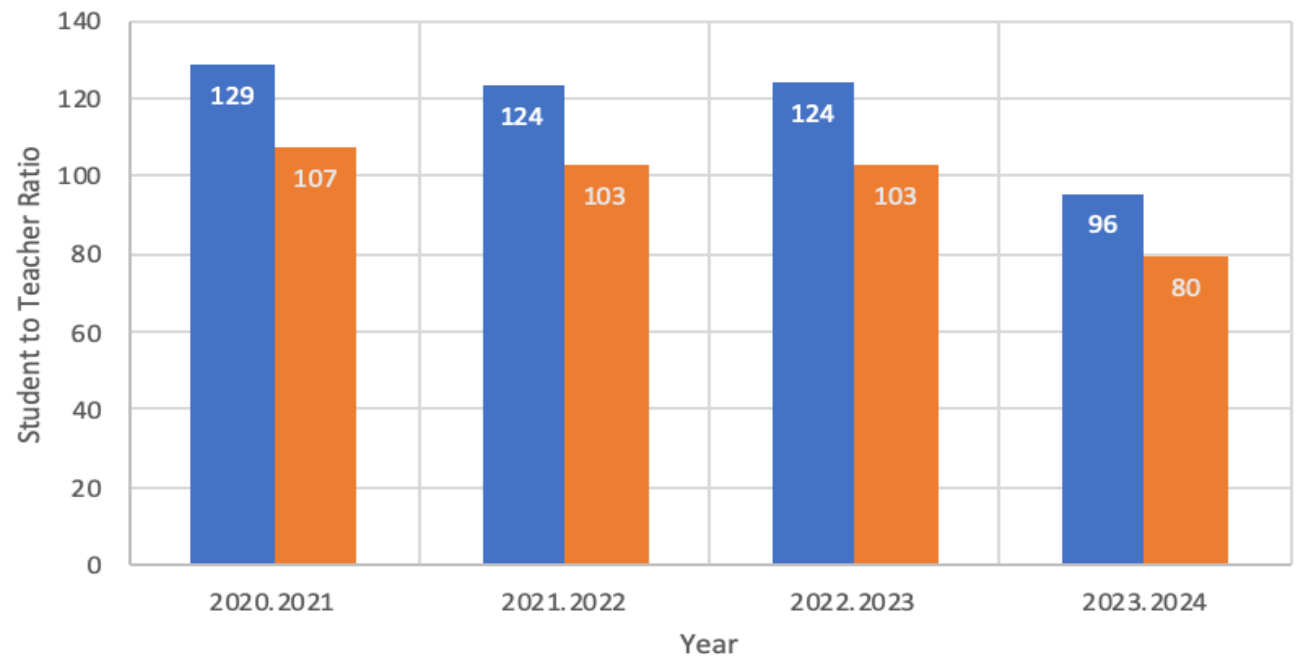
MODEL

- Input : Enrollment Totals Table for (2019 – 2020)
- Excel Formula Outputs (3)
 - Enrollment totals for each school year (2019 – 2024)
 - Student-teacher ratios
 - Number of teachers to hire/fire to bring S-T ratio to 100
- Link: <https://bit.ly/2LXFW0n>

SOLUTION

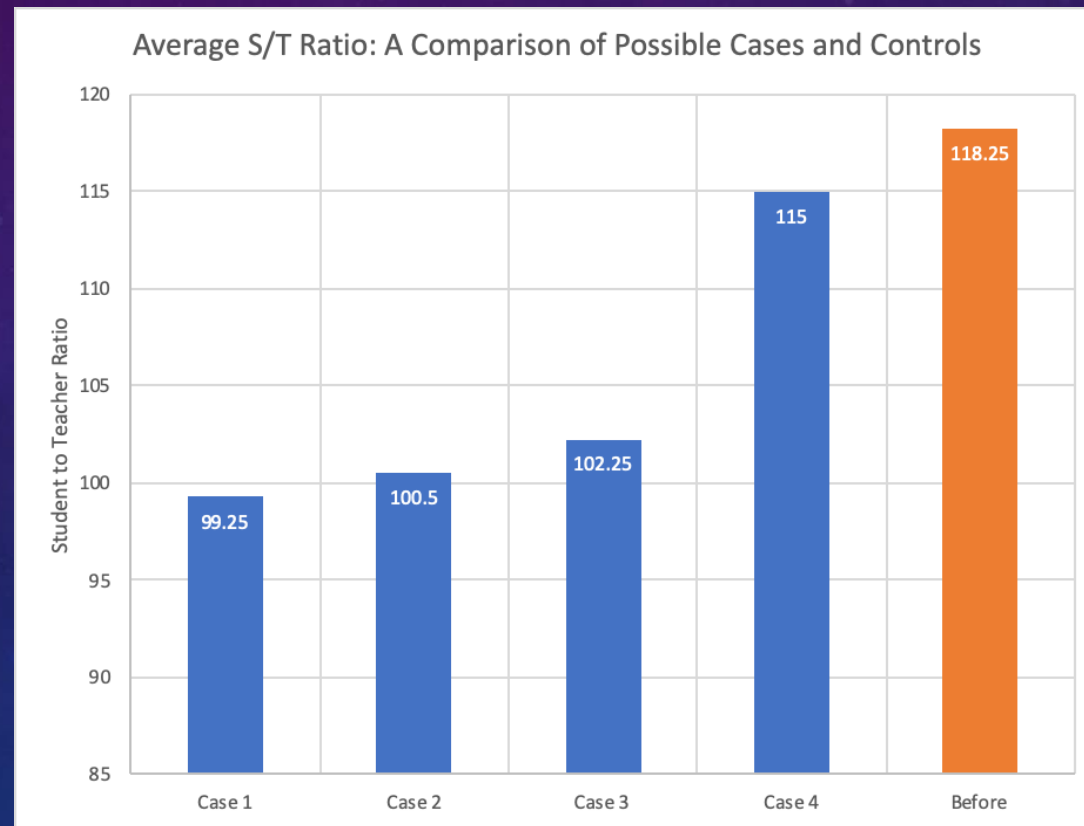
Subject	Teachers (#)
Biology	1
English	2
Mathematics	2
Music	1
Physics	1

A Comparison of Student to Teacher Ratios with and without Hired Teachers



AN ALTERNATE SOLUTION

Case 1: Alternate Solution	
	Added Teachers
Art	
Biology	2
Chemistry	
English	2
French	
German	
Spanish	
Mathematics	2
Music	1
Physics	
Social Studies	
Total	7



<https://bit.ly/2LXFW0n>

DISCUSSION

Strengths

- Models changing teacher requirements every year.
- Enrollment model is easily expanded for more years.
- Easily adapted to different sets of assumptions.
- Minimum input required.

Weakness

- Requires human interpretation of results

DISCUSSION (CONT.)

Error Analysis

- Class size appears to approach 0 after ~100 years, because the incoming class has the size of the senior class after drop-outs
- # of students in a grade that are taking a class is more than the total # of students. Students may be doubling up, or the assumption of a constant yearly dropout rate ($0.95^{1/4}$) is wrong.

Robustness and Stability (Generalizations)

- Easily modifiable to account for transfer students / new classes.
- Model will function for larger/smaller schools; more/less classes.