The State of California's Higher Education

Evaluating district-level performance, in order to optimize resource allocation

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Problem at hand

Background

Total state budget for public TK-12 education in 2018-19: $97.2 billion[1]

- This would allow for per-pupil spending of: $16,352

Question to be solved

Is this budget enough to achieve the desired educational outcomes?

Approach

- **Evaluate educational outcomes achieved in 2018-19:** Compare county-level educational outcomes (SAT and ACT results) to assess:
    1. County-level performance relative to national benchmarks
    2. County performance ranking with respect to educational outcomes
- **Review per-pupil expenditures:** Determine per-pupil county-level spending allocated for high-school students, in order to determine:
    1. Whether higher spending has any bearing on better educational outcomes

1. Budget reporting by the California Department of Education

SAT

A nationally-administered test that assesses skills required to succeed in a post-secondary academic environment

- Comprised of 2-section test, with a total score maximum of 1600:
  - Evidence-Based Reading and Writing,
  - Math,
- Students with scores that are at or above the set benchmark, have a 75% chance of earning at least a C in related post-secondary coursework
  - EBRW: 480
  - Math: 530
- County-level aggregates are calculated by:
  - Taking the average of district-level averages

More information about the ACT can be found [here](#)

Background

Looking at aggregated SAT data across all districts in California:

Number of Grade 12 Students Enrolled in California

1,382,324

% of Students who Met or Exceeded the Benchmark[2,3]

43.4%
Math: 45.8%
ERW: 68.3%

SAT Participation Rate[1]

36.8%
(508,395 grade 12 students took the test)

County	% meeting or exceeding both Math and ERW benchmarks	% meeting or exceeding Math benchmark	% meeting or exceeding ERW benchmark
Nevada	74.9%	76.7%	87.9%
Mariposa	72.2%	75.0%	91.7%
Tuolumne	67.9%	67.9%	87.2%
El Dorado	67.4%	70.7%	87.2%
Calaveras	66.7%	66.7%	91.3%

1 Reference: SAT dataset 2018-19
2 Calculated as an average across districts. The county-level ranking uses average of district averages by county.
3: SAT benchmark score: Math: 530; ERW: 480

ACT

A nationally- and internationally-administered test, designed to evaluate college and career readiness for 10th, 11th, and/or 12th grade level students.

- Comprised of 4 separate multiple-choice tests, each scored on a 1-36 scale:
  - English,   Reading,
  - Math,   Science
- Students with scores that are at or above the set benchmark, have a 75% chance of earning at least a C in related post-secondary coursework
  - English: 18   Reading: 22
  - Math: 22   Science: 23
- County-level aggregates are calculated by:
  - Taking the average of district-level averages

More information about the ACT can be found here

Background

Looking at aggregated ACT data across all districts in California:

Number of Grade 12 Students Enrolled in California

1,395,387

ACT Participation Rate[1]

17.8%
(247,941 grade 12 students took the test)

% of Students who Met or Exceeded the Benchmark[2,3]
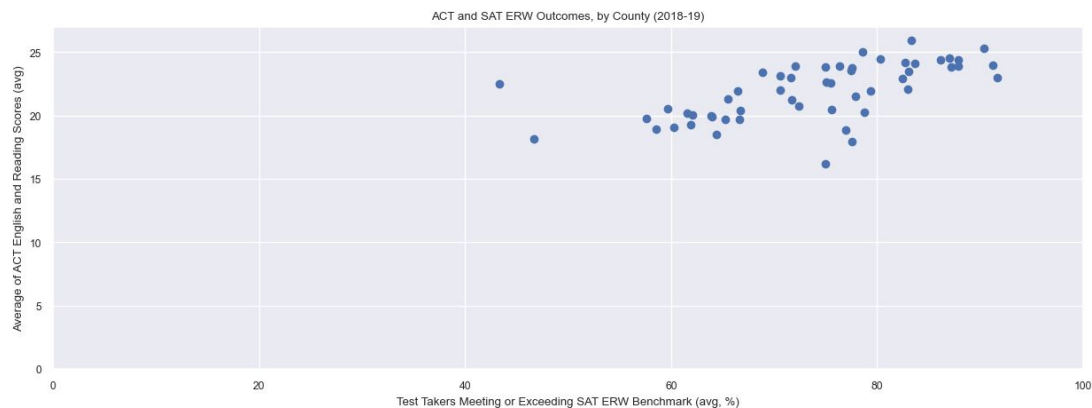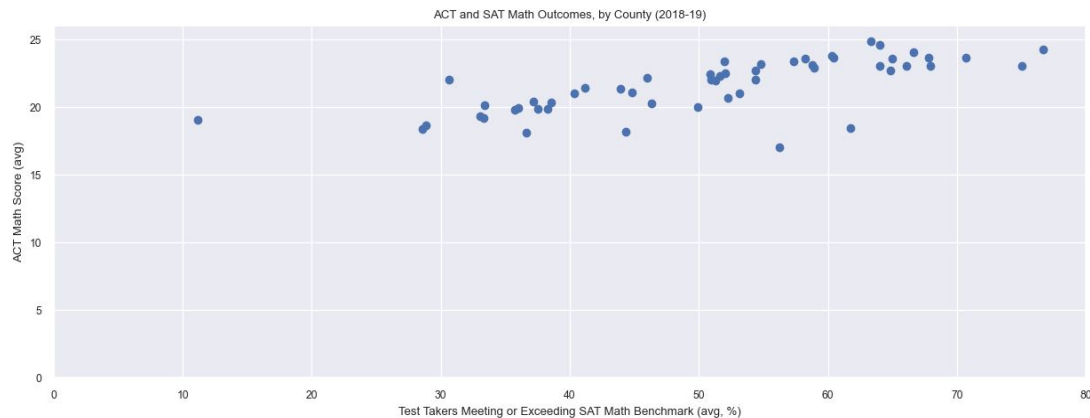
56.0%

Math: 21.4 / 36   English: 21.2 / 36
Science: 21.2 / 36   Reading: 22.1 / 36

County	Average Score - Math[3]	Average Score - Science	Average Score - English	Average Score - Reading	Average % receiving composite score ≥ 21
Calaveras	24.0	23.3	22.7	25.3	85.2%
Mono	23.3	24.0	24.7	26.0	79.3%
Amador	23.0	22.3	23.0	24.0	79.0%
Tuolumne	23.0	23.0	23.0	26.0	78.3%
Marin	24.5	24.3	25.6	26.2	76.8%

1 Reference: ACT dataset 2018-19
2 Calculated as an average across districts. The county-level ranking uses average of district averages by county.
3: The maximum score for each of the four tests is 36

Relationship between SAT and ACT performance

ACT and SAT Math Outcomes, by County (2018-19)

ACT and SAT ERW Outcomes, by County (2018-19)

We can see a moderate positive relationship between outcomes for ACT and SAT for both Math (R = 0.72) and ERW (R = 0.62) tests.[1]

1 ACT ERW proxy score was calculated as the average between the English and Reading test scores

Relationship between SAT and ACT performance

ACT and SAT Overall Outcomes, by County (2018-19)
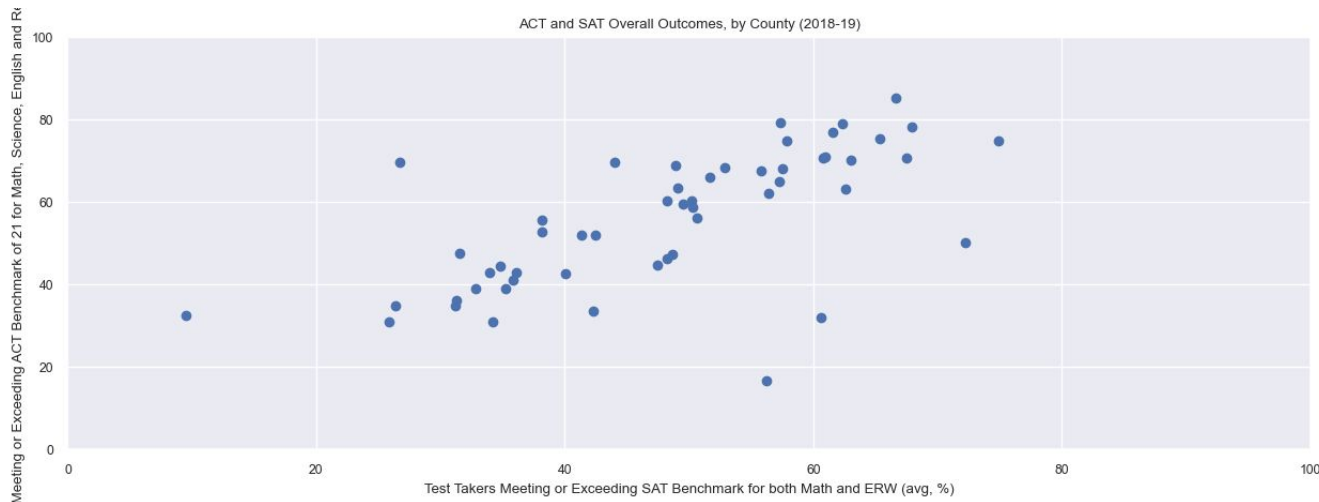
While there are many factors impacting the progress for each test, it would be important to:
1. Understand whether/how these factors differ with respect to SAT and ACT outcomes
2. Prioritize interventions that would meaningfully impact both SAT and ACT outcomes
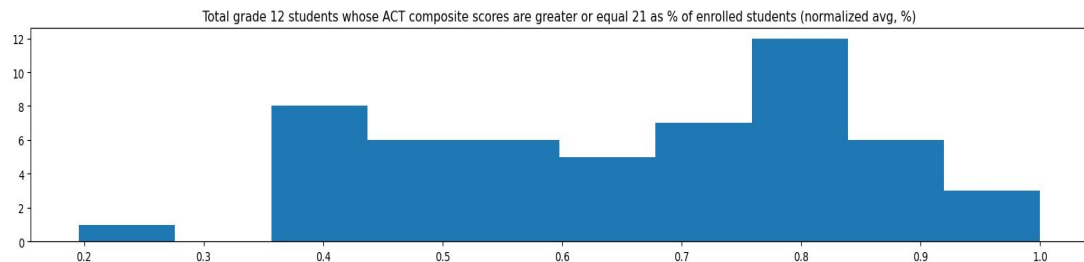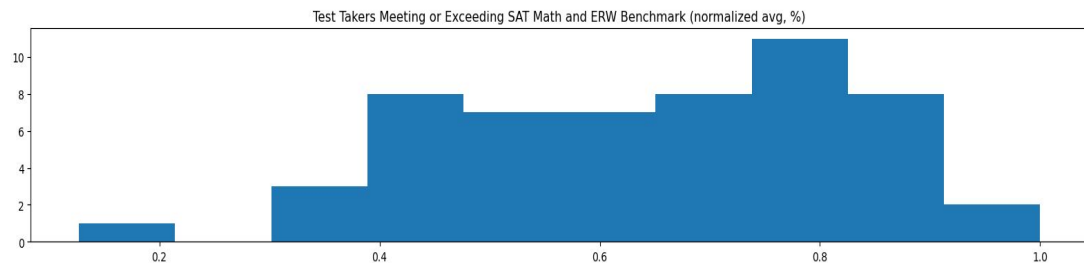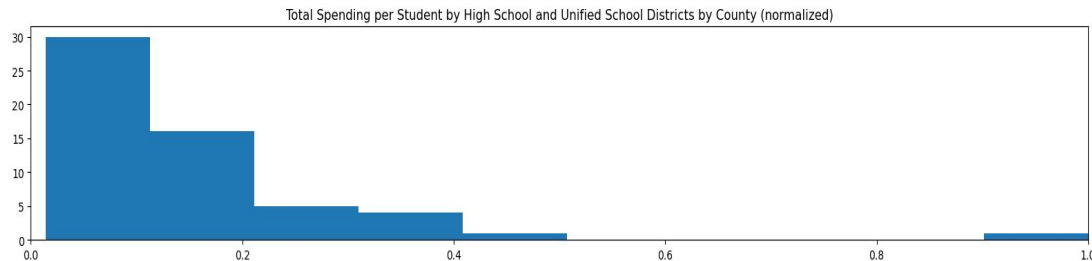
Overview of Education Spending in California

Current cost of education covers:

- Salaries   Employee benefits
- Books and supplies   Equipment replacement
- Services and indirect costs

Education expenses are reported per ADA:

- ADA (Average Daily Attendance) is the total days of student attendance divided by the total days of instruction. Current expenditure is divided by total ADA to estimate spending/student for each district
    - County-level aggregates are taken as the sum of per-pupil spending by LEA (local educational agencies)
- Cost is managed and reported by LEAs and aggregated by county to arrive at county-level expenditure estimates
- Per-Pupil spending used in the analysis is a subset of total per-pupil spending, taken as a sum of per-pupil spending by LEAs classified as Unified (k-12) or High (High School)

More information about the California's Education Financing and Expenditures can be found here

Overview of Education Spending in California

Total Spending per Student by High School and Unified School Districts by County (normalized)

Test Takers Meeting or Exceeding SAT Math and ERW Benchmark (normalized avg, %)

Total grade 12 students whose ACT composite scores are greater or equal 21 as % of enrolled students (normalized avg, %)

Los Angeles has the highest spending per student, but does not stand out with ACT or SAT success, relative to other counties.

Overview of Education Spending in California

Spending vs SAT outcomes, by County (2018-19)

Spending vs ACT outcomes, by County (2018-19)
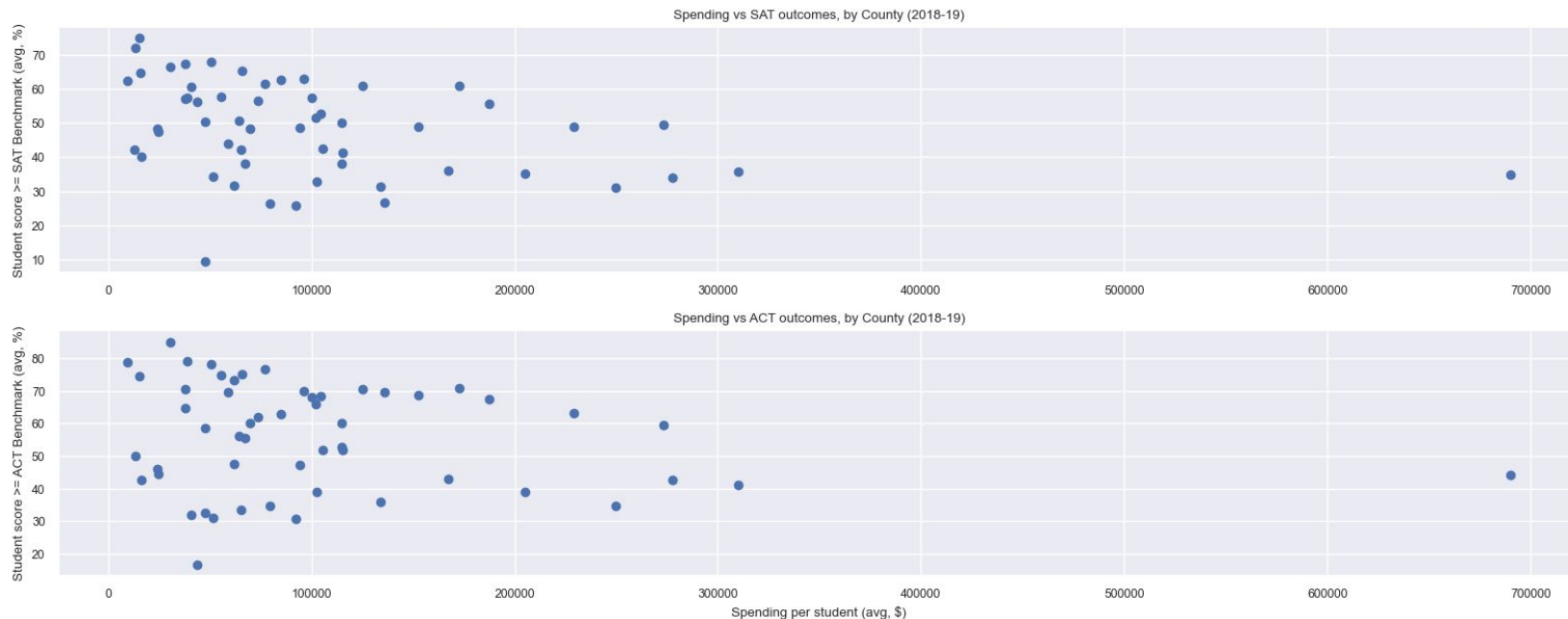
Increases in spending per student were observed to have a slightly negative relationship with:
- % of grade 12 students meeting or exceeding the SAT benchmark (R = -0.32)
- % of grade 12 students meeting or exceeding the ACT score of 21 (R = -0.17)

Summary of findings

1. Just 43.4% of California students met or exceeded the SAT benchmark.

   a. While 56% of students met or exceeded the ACT benchmark, fewer students take the ACT

2. California students fare worse in Mathematics than English, Reading, or Writing

   a. SAT and ACT outcomes in mathematics were closely related, implying that interventions and variables impacting performance in mathematics, impacts test-takers for both tests

3. Higher spending per pupil did not result in better educational outcomes

What's next?

1. Confirm that SAT and ACT results:
   a. How well they reflect educational outcomes
   b. How they relate to acceptance and success criteria in post-secondary education
   c. How they compare to other factors that evaluate educational outcomes, especially with respect to accounting for geographic and economic dispersion, English proficiency, and diversity and representation
2. Review spending per student calculations to finalize outcomes
3. Consider conducting a cohort-based analysis, to see whether a continuous 4-year investment results in improved educational outcomes
4. Define and evaluate factors that impact resource allocation in education
5. Conduct time-series analysis to test factors identified as having a significant impact on resource allocation effectiveness for education outcomes