

Using the SAT and ACT Scores for Placement into Engineering Placement Courses

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Abstract

- ACT, Inc. has suggested a college readiness benchmark for the first College Calculus course of 27 on the ACT Math test. In comparing the ACT Math to the SAT Math, the ACT Math tests for Trigonometry knowledge while the SAT Math only tests through Algebra II (including Geometry).
- **Research Questions:**
 - Could the ACT Math or SAT Math scores be used to predict a grade of "C" or better for all the first term engineering courses?
 - Which test, the ACT Math or SAT Math, produces a better prediction?

Methodology

1. Selected subset of students who took BOTH the ACT and SAT tests (40% of freshmen)
2. Evaluate the effectiveness of the ACT Math and SAT Math as predictors using a 2x2 contingency table analysis using:
 1. Test Efficiency
 2. Test Specificity
 3. Test Sensitivity
3. For the ACT Math, use 27 as the Cut-Point; for the SAT Math, use 610 as the Cut-point for the contingency table analysis.

Results

Test Efficiency.

Test Efficiency = % of Students whose grades were accurately predicted

Calculus I	Number of Students Grade < C	Number of Students Grade ≥ C
ACT Math < 27	7	20
ACT Math ≥ 27	4	136

Calculus I Contingency Table using ACT Math score

Test Efficiency = $(7+136)/167=86\%$
 (167= Total all cells)

Freshman Engineering Course	ACT Math Efficiency (%)	SAT Math Efficiency (%)	Difference (%)
Calculus I	86	74	12*
Calculus II	92	92	0
Chemistry I	86	79	7*
Engineering 100	89	83	6
Engineering 101	90	89	1

* Difference is Statistically Significant ($p < .05$)

Test Specificity

Test Specificity = % of all students who earned a C or better for high values of the ACT Math or SAT Math

Calculus I	Number of Students Grade < C	Number of Students Grade ≥ C	Total
ACT Math < 27	7	20	27
ACT Math ≥ 27	4	136	140

Calculus I Contingency Table using ACT Math Score

Test Specificity = $136/140=97\%$

Freshman Engineering Course	Test Specificity For the ACT Math (%)	Test Specificity For the SAT Math (%)	Difference (%)
Calculus I	97	95	2
Calculus II	97	97	0
Chemistry I	94	94	0
Engineering 100	99	98	1
Engineering 101	95	96	-1

Discussion

- Some engineering colleges use the ACT math or SAT math test as an initial filter for placement into Calculus I
- For all courses, the test efficiency for the ACT Math was higher or equal to the ACT SAT at 86% or more.
- For Calculus I and Chemistry, the ACT math test was statistically significant (better) compared to the SAT Math in predicting academic success ("C" or better)

Conclusions

- Recommend using the ACT Math or SAT Math as an initial filter for placement into the first Calculus course (very high specificity)
- Overall, for all courses, the ACT Math test is a better predictor of success in engineering courses than the SAT Math test and should be used in more student success predictions.

- Recommend more Confirmatory Analyses

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- ACT, Inc., reference: www.act.org, Information Brief 2002-2