

ST. JAMES ACADEMY

SPARK CENTER FOR ACADEMICS

Year 1 Impact Study

Prepared: May 2023

multistudio

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A plain English description of the primary findings. This is useful for everyone.

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An explanation of where we got the data. This will be most useful for people who want to know more about the study design.

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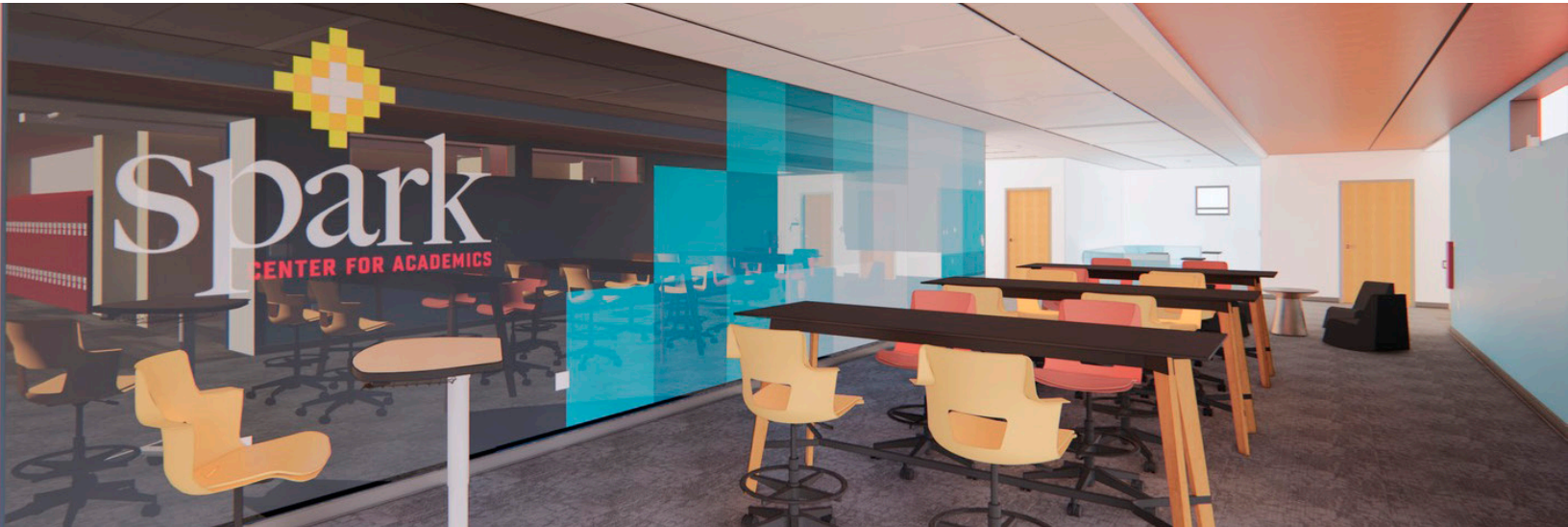
A technical explanation of the modeling techniques and statistical methods we used to analyze the data. This will be most useful to other researchers.

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This is a detailed library of graphs and calculations from the study. This is useful for someone with a specific, detailed question about the data in the study.

01

Executive Summary



About This Report

The Spark Center for Academics increases college readiness.

Multistudio's Research Center together with St. James Academy staff looked at how student usage of the newly created Spark Center for Academics (Spark Center) helped students to better prepare for college success after graduation.

Researchers studied data across all students in the 2022-2023 academic year and statistically modeled student performance on standardized tests, like the American College Test (ACT). The results show that use of the Spark Center helps students perform better across English and Mathematics. Student scores on the ACT provided a research estimate for the students' college readiness and future success.

When students are engaged with the Spark Center, they get close support from both teachers and older peers who have experience in the areas where they need help. Students can engage by simply visiting the Spark Center for general help, to get targeted support in subjects like Math and English, and even to work as "Spark Plugs" who get repeated practice by working as peer mentors to other students. The study results showed that more engagement translated to higher scores on ACT scores in English and Mathematics. Student learning in the Spark Center further develops students as members of the St. James family, growing their minds through academics and their hearts in relationship with their peers and teachers.

How much impact did the Spark Center have on students?

We know many factors affect how students perform on big assessments, like the ACT. Our study of the Spark Center integrated historical data for student performance to account for things like prior knowledge. We used statistics to estimate how students with very similar backgrounds, but different levels of Spark Center engagement, performed on the ACT.

Imagine a hypothetical student, let's call him "James," who starts as a freshman with typical scores (neither very high nor very low) on the placement exams he took as an 8th grader. We can use both his entry and progress scores in our statistical model to estimate James' ACT performance. If he has no Spark Center engagement, he would expect to score about 26.4* on the ACT: English. If he has lots of engagement with the Spark Center, his predicted **score goes up to 27.0* on the ACT: English.**

Let's look at another hypothetical student, "Bernadette," for the ACT: Math. With no Spark Center engagement she would expect to score 22.6*. However, with lots of engagement her predicted **score goes up to 23.3*!**

On the ACT scale (going from 1-36) both those increases with Spark Center engagement are statistically significant. The higher ACT scores show the student experiences in the Spark Center set them up for greater success at the college level.

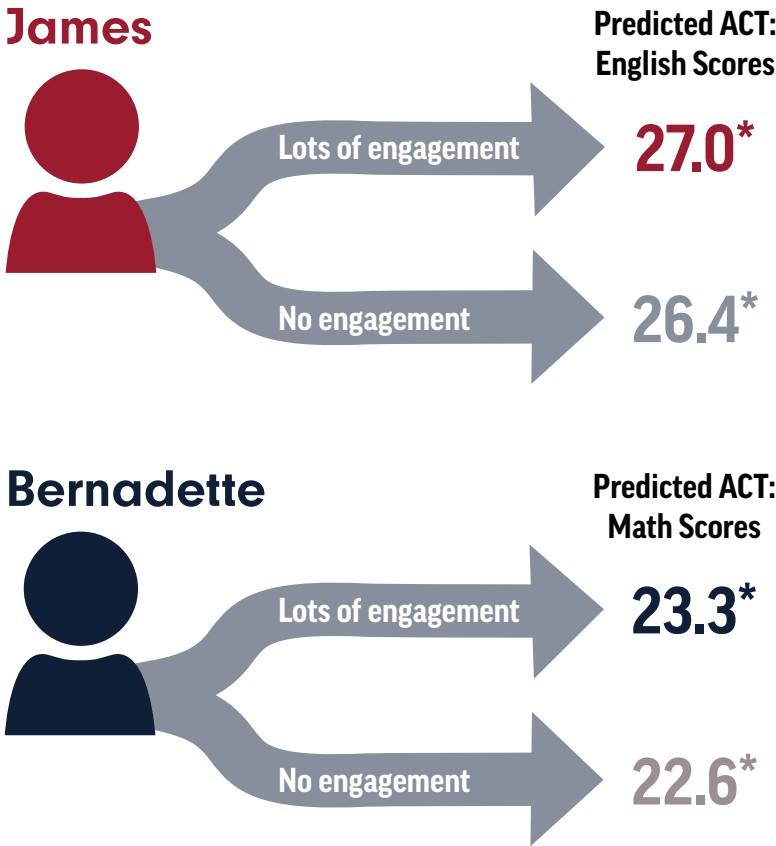


Figure 1

* Note: The ACT doesn't report individual scores with a decimal, but it is useful here for thinking about overall trends.

Who is engaged in the Spark Center?

Most students at St. James Academy have visited the Spark Center at least once during the 2022-2023 academic year! We saw larger percentages of younger visitors (freshman and sophomores) using the Spark Center, which helped them get connected alongside their peers and to meet older students who can mentor them from their own experience. **Table 1**

OVERALL SPARK CENTER VISITS

Class	Student Visitors	Total Students	Percent
2023	124	211	59%
2024	136	209	65%
2025	179	232	77%
2026	201	260	77%

Table 1

Note: Visits are only one of multiple ways we considered engagement.

The many layers of engagement.

The Spark Center is already a community hub, with a total of **3,245 student** visits from August-March in the 2022-2023 academic year. It is a vibrant community space where students and faculty can connect to work together on general daily tasks, to get focused help on high-priority subjects like English and Math, and to work in an active mentor role for other students visiting the space.

- Many students visited the Spark Center multiple times throughout the school year. Some of the most frequent users checked in over 30 times! **Figure 2**
- Many students visited the Spark Center to get focused help on their English classes. This was especially frequent among freshman (Class of 2026). **Figure 3**
- Many students also visited the Spark Center to get focused help on their math classes (algebra, geometry, and calculus). This was more common with older students, especially sophomores (Class of 2025). **Figure 4**

SPARK CENTER USAGE

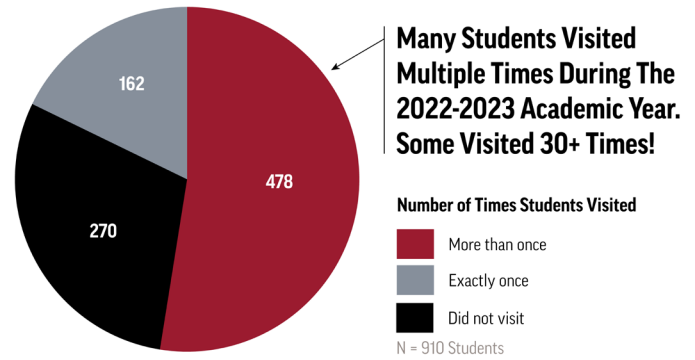


Figure 2

FREQUENCY OF VISITS FOR ENGLISH

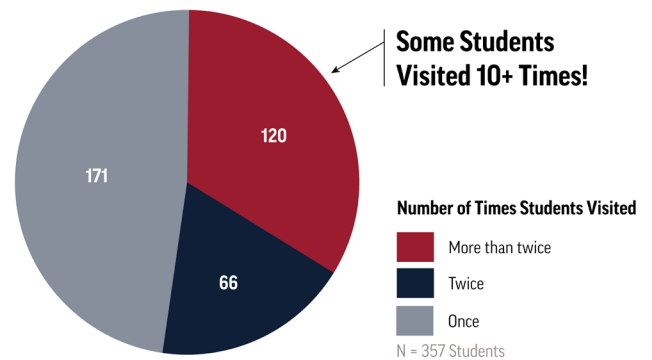


Figure 3

FREQUENCY OF VISITS FOR MATH

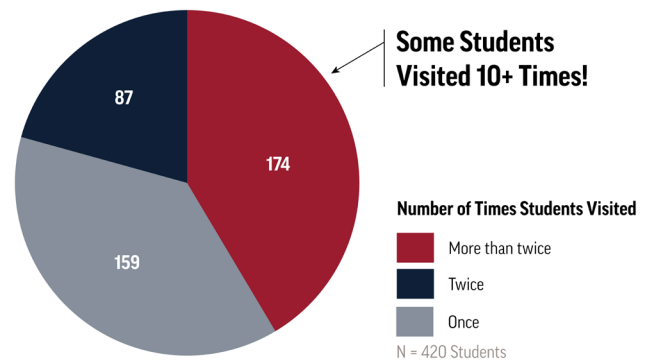


Figure 4

02

Data Sources

Data Sources

Sample Characteristics

- 919 total students
- 9th – 12th grade
- Data were collated for this study in March of 2023.
- Data were never analyzed for individual students, and all identifiable data are housed in secure research servers maintained by Multistudio.

STUDENTS BY GRADUATING CLASS

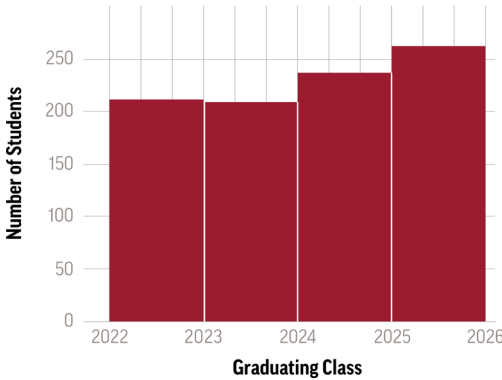


Figure 5

Placement Data – HSPT

The High School Placement Test (HSPT) scores were obtained for most students in the sample. Study data included the comprehensive score, as well as both English and math sub-scores.

Outcome Scores – ACT

The ACT (formerly the American College Testing) was our primary outcome variable. We collected ACT scores from both 2022 and 2023, but most analyses focused on the 2023 scores from the school-wide administration in February of 2023.

Additional Progress – KS State

We did obtain data for the standardized state tests in English and math. However, these data were very incomplete and otherwise flawed due to COVID disruptions. We did not use them much in this study.

Progress Scores – Fast Bridge

Student progress scores in the model came from both Fall and Winter 2022 Fast Bridge performance. Both administrations of this assessment included reading and math scores.

Spark Center Engagement

Most engagement data was originally generated by faculty supervisors of the Spark Center during student check-ins while entering the space. Our data is cutoff at the end of February 2023, to focus on the outcome variable generated at that time. Our model of Spark Center of engagement also considered two other factors that helped provide a more complete picture of usage since it opened:

- We included Spark Center check-in data from the 2021-2022 academic year. However, that process was still being developed and not all student check-ins ended up in the usable data. We used what we could, but it wasn't a focus of this study.
- We included student participation as "Spark Plugs" as a separate category. These students were available to help other visitors (like tutors). While they often didn't work on their own classes, many reported it was helpful to get to teach material to others—so we included it.

03

Analysis Overview

Analysis Overview

Modeling Engagement – Rasch Rating Scale Model (RSM)

We used the Spark Center engagement indicators to create a Rasch model of engagement as a two constructs: “engagement for English” and “engagement for Math”.

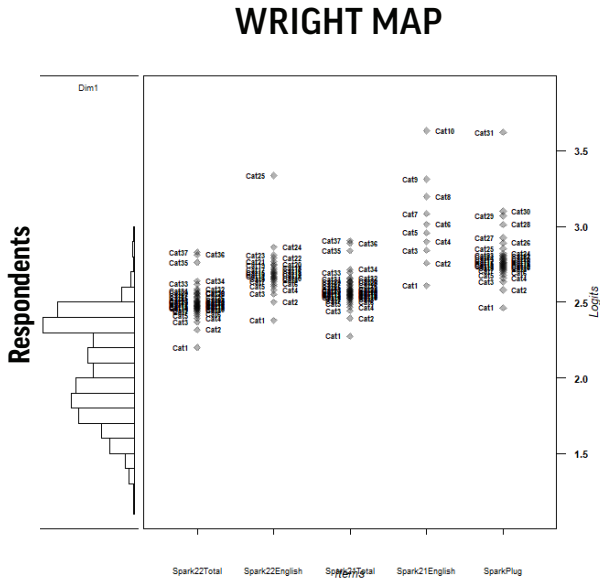


Figure 6
This is the Wright Map for “engagement for English”. The EAP reliability for this model was 0.587. We used this model to output logit estimates of engagement for English (and the standard error) for each student.

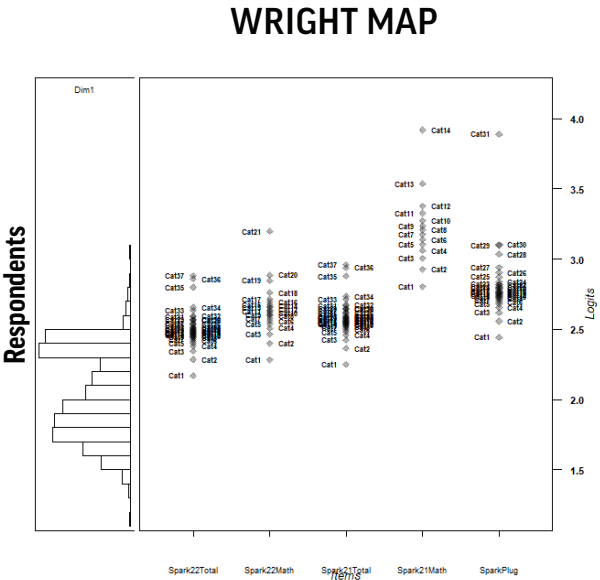


Figure 7
This is the Wright Map for “engagement for Math”. The EAP reliability for this model was 0.629. We used this model to output logit estimates of engagement for math (and the standard error) for each student.

Multiple Regression (Linear Modeling)

Next, we used the logit estimates of engagement to construct a linear model of student ACT performance based on prior knowledge (HSPT), progress (Fast Bridge) and Spark Center engagement (logit) data.

SUMMARY OF THE MODEL: ENGLISH
 English <-lm(ACT23english ~ HSPTeng * fbFall22aReading * elaRSM, data=dat)

Coefficients:	Estimate	Std. Error	t Value	Pr (> t)
(Intercept)	-4.039e+02	1.655e+02	-2.441	0.0155 *
HSPTeng	5.439e+00	2.831e+00	1.921	0.0561 .
fbFall22aReading	7.490e-01	2.997e-01	2.499	0.0133 *
elaRSM	1.886e+02	7.362e+01	2.561	0.0112 *
HSPTeng : fbFall22aReading	-9.498e-03	5.019e-03	-1.892	0.0599 .
HSPTeng : elaRSM	-2.974e+00	1.327e+00	-2.242	0.0261 *
fbFall22aReading : elaRSM	-3.365e-01	1.334e-01	-2.523	0.0124 *
HSPTeng : fbFall22aReading : elaRSM	5.296e-03	2.346e-03	2.258	0.0250 *

Table 2

While there is lots of information in this model summary for English, a major finding is the highlighted row showing a significant positive estimate for the Spark Center engagement term (elaRSM). We used this linear model to create the “typical student” predictions in the Executive Summary.

Simplified Linear Modeling

To make it easier to interpret these results, we also created a simplified linear model using only placement data (HSPT) and outcome (ACT) data. These linear models are binned into general “low/medium/high” engagement groups to show how student performance changes with Spark Center engagement.

EFFECTS OF INCREASED SPARK CENTER ENGAGEMENT

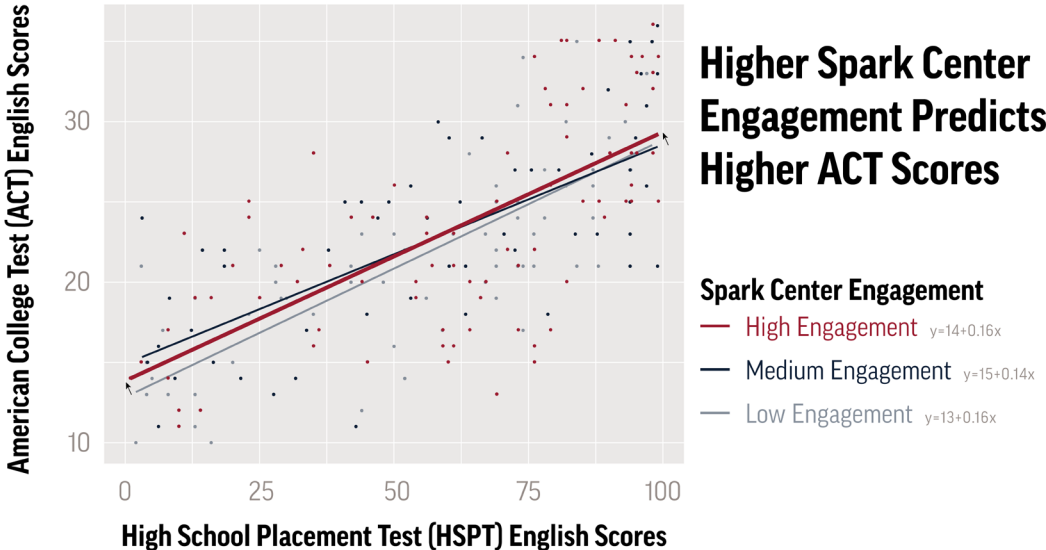


Figure 8
 Notice how the intercept term in the linear equation for medium and high engagement is higher ↑ than the term in low engagement.

Multiple Regression (Linear Modeling)

We did the same analysis for Math. We used the logit estimates of engagement to construct a linear model of student ACT performance based on prior knowledge (HSPT), progress (Fast Bridge) and Spark Center engagement (logit) data.

SUMMARY OF THE MODEL: MATH

Math <-lm(ACT23math ~ HSPTmath * fbFall22aMath * mathRSM, data=dat)

Coefficients:	Estimate	Std. Error	t Value	Pr (> t)	
(Intercept)	-1.616e+02	7.034e+01	-2.298	0.02262	*
HSPTmath	-6.020e-01	1.050e+00	-0.574	0.56695	
fbFall22aMath	8.231e-01	3.121e-01	2.637	0.00903	**
mathRSM	7.936e+01	3.338e+01	2.377	0.01840	*
HSPTmath : fbFall22aMath	1.811e-03	4.456e-03	0.406	0.68497	
HSPTmath : mathRSM	4.161e-02	4.812e-01	0.086	0.93117	
fbFall22aMath : mathRSM	-3.716e-01	1.485e-01	-2.503	0.01313	*
HSPTmath : fbFall22aMath : mathRSM	3.890e-04	2.047e-03	0.190	0.84947	

Table 3

While there is lots of information in this model summary for Math, a major finding is the highlighted row showing a significant positive estimate for the Spark Center engagement term (elaRSM). We used this linear model to create the “typical student” predictions in the Executive Summary.

Simplified Linear Modeling

To make it easier to interpret these results, we also created a simplified linear model using only placement data (HSPT) and outcome (ACT) data. These linear models are binned into general “low/medium/high” engagement groups to show how student performance changes with Spark Center engagement.

EFFECTS OF INCREASED SPARK CENTER ENGAGEMENT

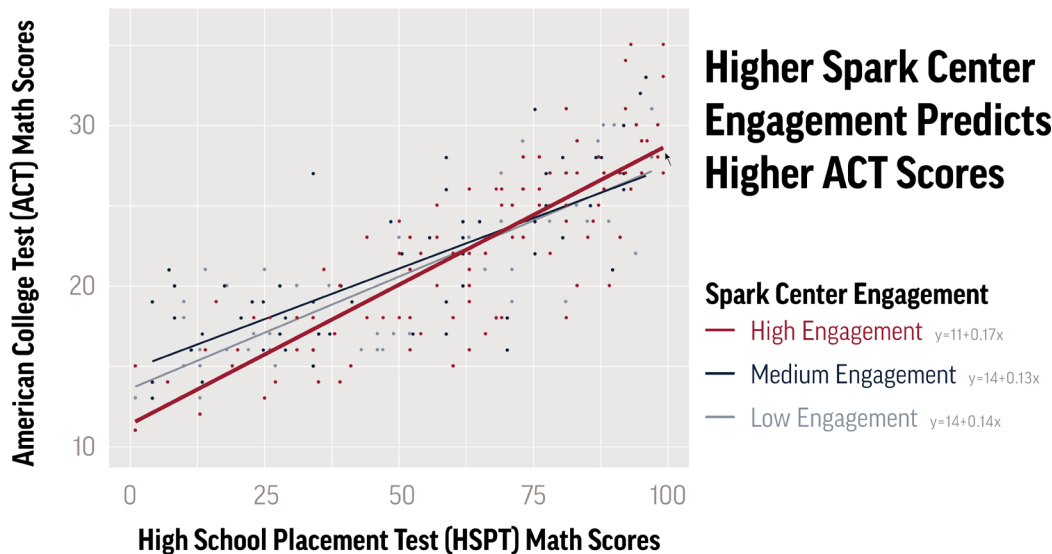


Figure 9

Notice how, in this case for Math, the intercept term in the linear equation does not change or goes down. However, the slope term increases. ↑

04

Results Appendix

Result Appendix

Placement Data – HSPT

Overall distributions of HSPT scores.

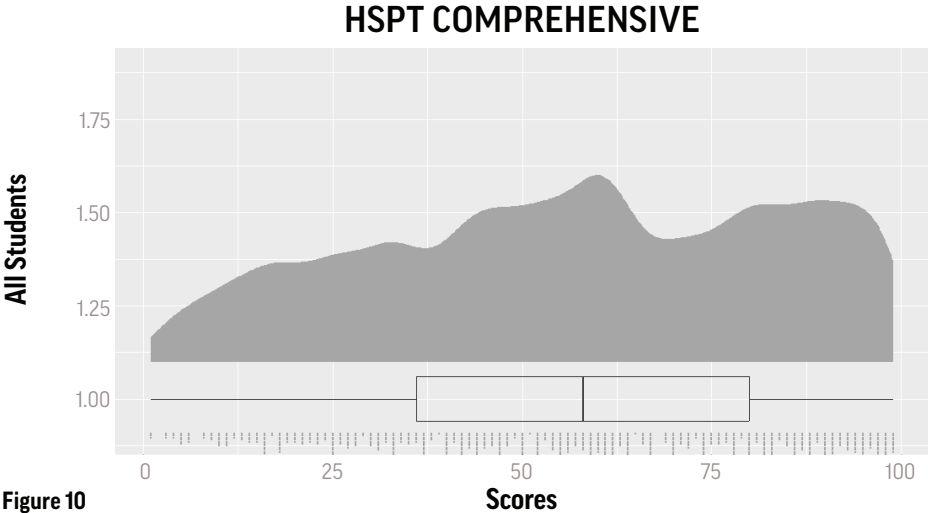


Figure 10

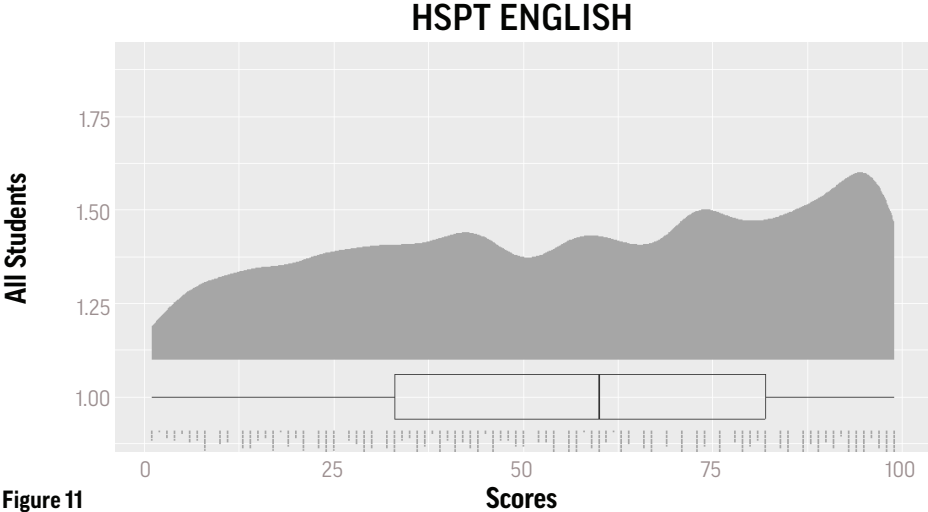


Figure 11

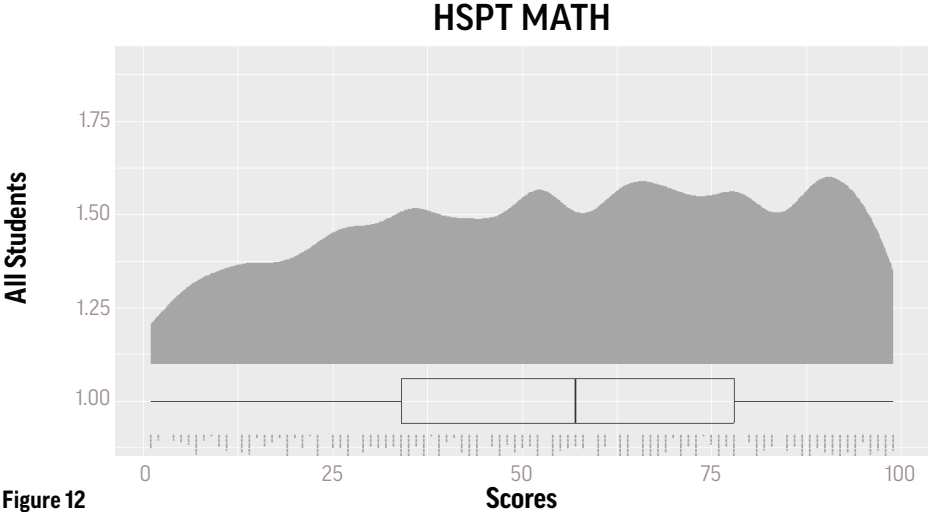


Figure 12

Progress Data – Fast Bridge

Overall distributions of Fast Bridge Scores

FAST BRIDGE SCORE DISTRIBUTION

Fall, Reading

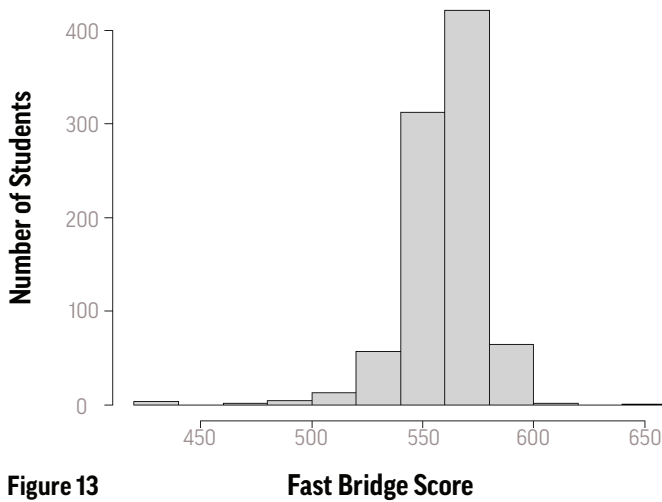


Figure 13 **Fast Bridge Score**

Normality: $W = 0.93822$, $p\text{-value} < 2.2e-16$

Correlation: $S = 12252294$, $p\text{-value} < 2.2e-16$
 $Rho = 0.833$

FAST BRIDGE SCORE DISTRIBUTION

Winter, Reading

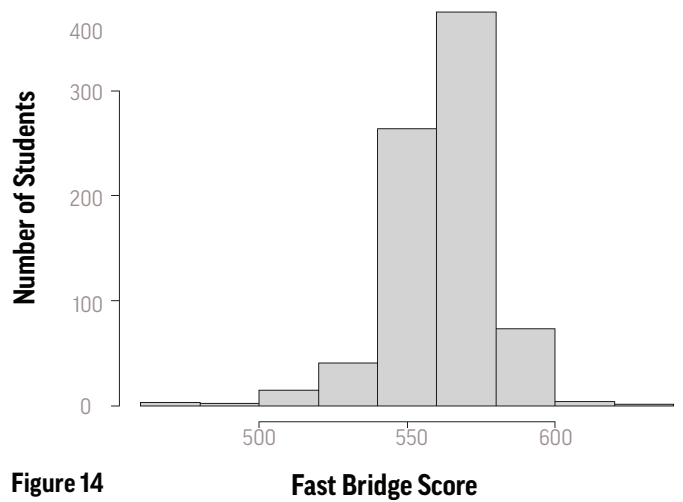


Figure 14 **Fast Bridge Score**

Normality: $W = 0.87635$, $p\text{-value} < 2.2e-16$

Correlation: $S = 12252294$, $p\text{-value} < 2.2e-16$
 $Rho = 0.833$

FAST BRIDGE SCORE DISTRIBUTION

Fall, Math

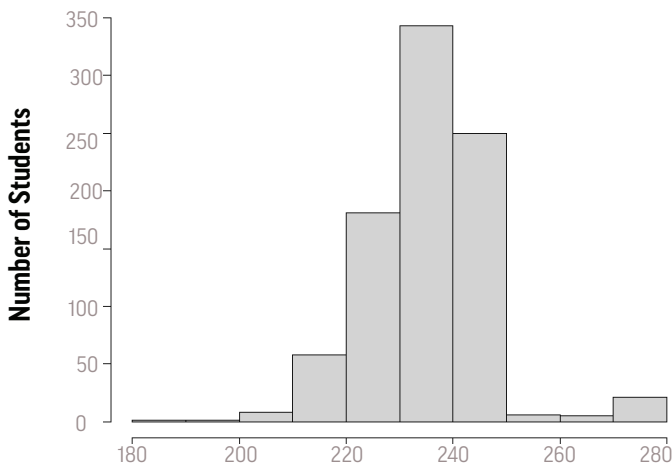


Figure 15 **Fast Bridge Score**

Normality: $W = 0.71002$, $p\text{-value} < 2.2e-16$

Correlation: 9420372 , $p\text{-value} < 2.2e-16$
 $Rho = 0.902$

FAST BRIDGE SCORE DISTRIBUTION

Winter, Math

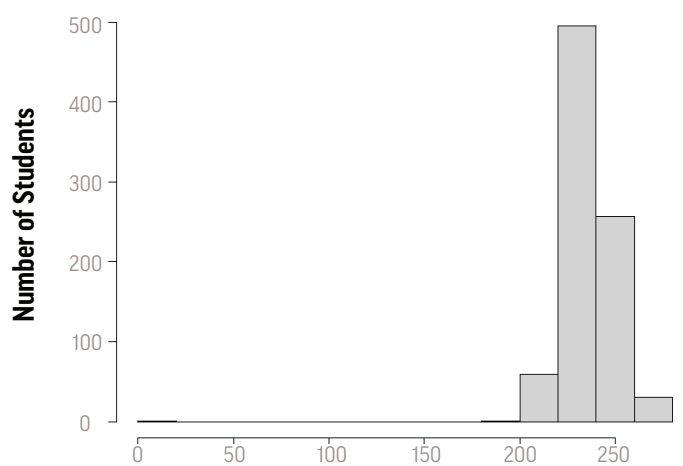


Figure 16 **Fast Bridge Score**

Normality: $W = 0.93398$, $p\text{-value} < 2.2e-16$

Correlation: 9420372 , $p\text{-value} < 2.2e-16$
 $Rho = 0.902$

Outcome Data – ACT

Overall distributions of ACT Scores.

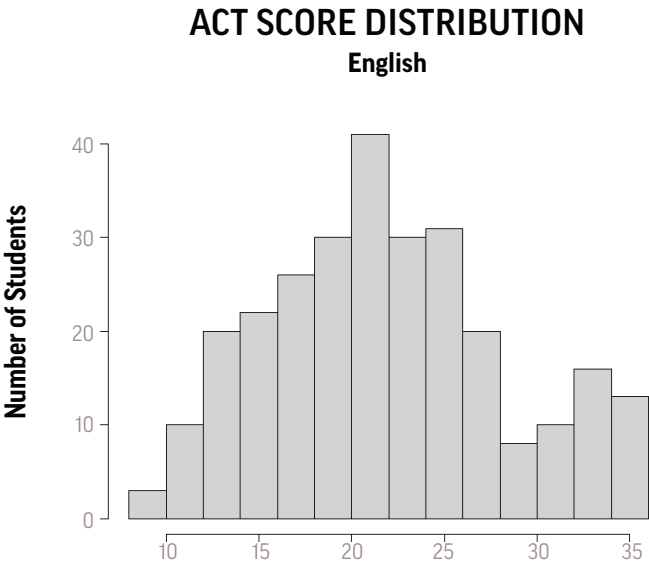


Figure 16
ACT Score
Normality: W = 0.9741, p-value = 5.825e-05

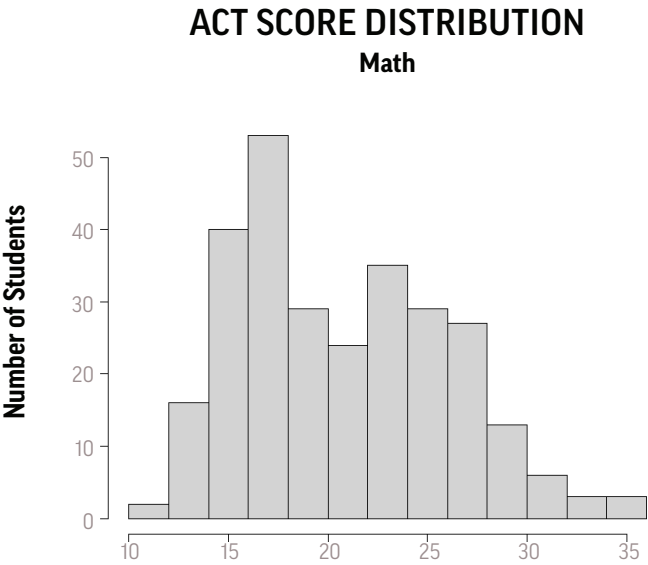


Figure 17
ACT Score
Normality: W = 0.97338, p-value = 4.483e-05

State Assessment Analysis

Diligence analysis of Kansas state assessment score models. Due to flaws, these should be interpreted with caution.

STATE ASSESSMENT ANALYSIS: ENGLISH

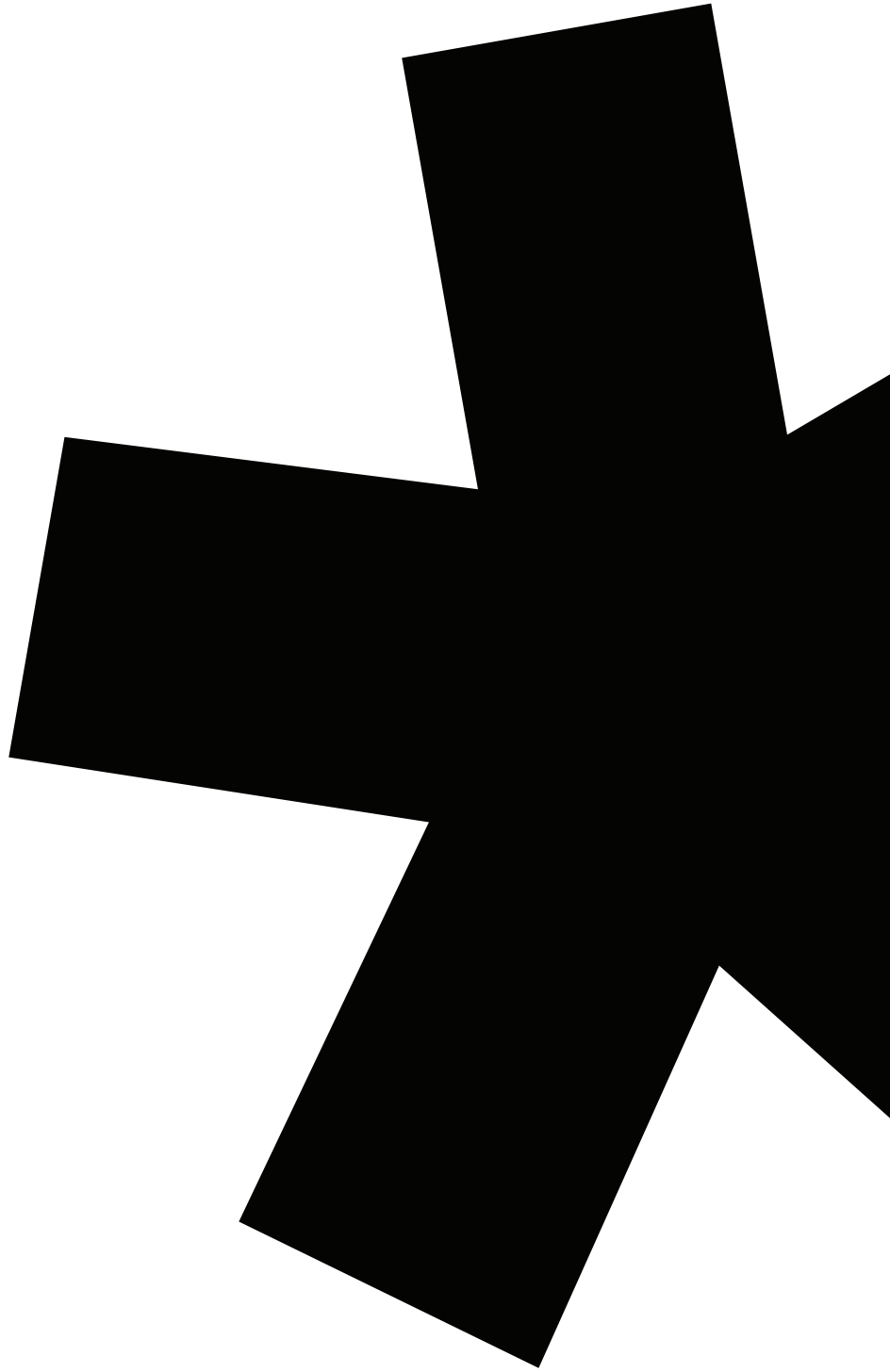
Coefficients:	Estimate	Std. Error	t Value	Pr (> t)
(Intercept)	252.0289	25.2604	9.977	<2e-16 ***
HSPTEng	0.5568	0.3630	1.534	0.127
elaRSM	8.2467	12.3420	0.668	0.505
HSPTEng : elaRSM	0.0383	0.1753	0.218	0.827

Table 4

STATE ASSESSMENT ANALYSIS: MATH

Coefficients:	Estimate	Std. Error	t Value	Pr (> t)
(Intercept)	291.27417	35.20749	8.273	4.06e-14 ***
HSPTEng	-0.03526	0.48832	-0.072	0.9425
mathRSM	-21.16419	17.17074	-1.233	0.2195
HSPTEng : mathRSM	0.42413	0.23540	1.802	0.0734 .

Table 5



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