

REPORT

***Ewing Marion Kauffman School
Evaluation Impact Report
Year 5***

May 23, 2017

Matthew Johnson
Alicia Demers
Cleo Jacobs Johnson
Claudia Gentile

Submitted to:

Ewing Marion Kauffman Foundation
4801 Rockhill Road
Kansas City, MO 64110
Project Officer: Matthew Carr
Contract Number: EMKF110429394

Submitted by:

Mathematica Policy Research
505 14th Street
Suite 800
Oakland, CA 94612
Telephone: (510) 830-3700
Facsimile: (510) 830-3701
Project Director: Claudia Gentile
Reference Number: 06921

This page has been left blank for double-sided copying.



EXECUTIVE SUMMARY

As part of its ongoing efforts to raise the academic achievement of children from low-income families in Kansas City, Missouri, the Ewing Marion Kauffman Foundation founded the Ewing Marion Kauffman School in fall 2011. The Kauffman School’s mission is “to prepare students to excel academically, graduate from college, and apply their unique talents in the world to create economically independent and personally fulfilling lives” (Ewing Marion Kauffman School 2017).

As a public charter school, the Kauffman School is tuition-free and serves students living in Kansas City. In the 2015–16 school year, the Kauffman School enrolled 714 students in grades 5 through 9; 86 percent of the students were low-income, and 90 percent were black or Hispanic.

The Kauffman School has ambitious goals for its students, including accelerated learning, high attendance levels, and exemplary behavior. In this report, we summarize information about the impact of the Kauffman School on student achievement, attendance, and suspension rates.

Data and methods. Data used for the report came from the Missouri Department of Elementary and Secondary Education and included student achievement on the Missouri Assessment Program (MAP) and end-of-course (EOC) exams, information on attendance and suspensions, and demographic characteristics of the students. To estimate the impact of the Kauffman School on its students, we identified a group of similar students attending other Kansas City public schools and then compared the two groups on key impact measures. We provide more details on our analytic approach in the full report.

Main findings. Our findings indicate that, in each of its first five years of operation (the 2011–12 through 2015–16 school years), the Kauffman School had positive, statistically significant, and educationally meaningful impacts on student achievement growth in mathematics, English language arts (ELA), and science, beyond the growth achieved by students in other Kansas City public schools.

Table ES.1 presents results based on the number of years since a student enrolled in the Kauffman School. In every subject and year examined, the Kauffman School’s impact on test scores is positive and statistically significant, indicating that the school is outperforming other local schools serving similar students.

Table ES.1. Impact of Kauffman School on student test scores (reported in effect-size units)¹

	Cohorts included	Mathematics/ Algebra I	ELA	Science/Biology
Impact one year after enrollment (5th grade)	I-V	0.35	0.28	0.45
Impact two years after enrollment (6th grade)	I-IV	0.39	0.19	n.a.
Impact three years after enrollment (7th grade)	I-III	0.63	0.41	n.a.
Impact four years after enrollment (8th grade)	I-II	0.96 ^a	0.47	0.64
Impact five years after enrollment (9th grade)	I	0.94	n.a.	1.25

Notes: All results are statistically significant at the 1 percent level. The five-year impact estimates are based on the Algebra I and biology EOC exams. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no five-year impact for ELA because no EOC ELA exam is administered to 9th graders.

^a The four-year mathematics impact is based in part on imputed outcome data. See footnote 2 for details.

ELA = English language arts; n.a. = not applicable

The effect-size units reported in Table ES.1 are useful but not very intuitive. To translate the results into units that are more readily interpretable, we turn the effect sizes into years of learning growth through a commonly used conversion method for effect sizes (Bloom et al. 2008). In Figure ES.1, we display the impact estimates converted to years of learning growth for Kauffman students. When performing this conversion, we assume that comparison students in Kansas City public schools on average achieve one year of learning growth per school year. One of the goals stated in the Kauffman School’s charter is that its students on average will achieve at least 1.25 years of learning growth for each year that they are enrolled in the school. The Kauffman School has achieved this goal in each subject for all enrollment durations.

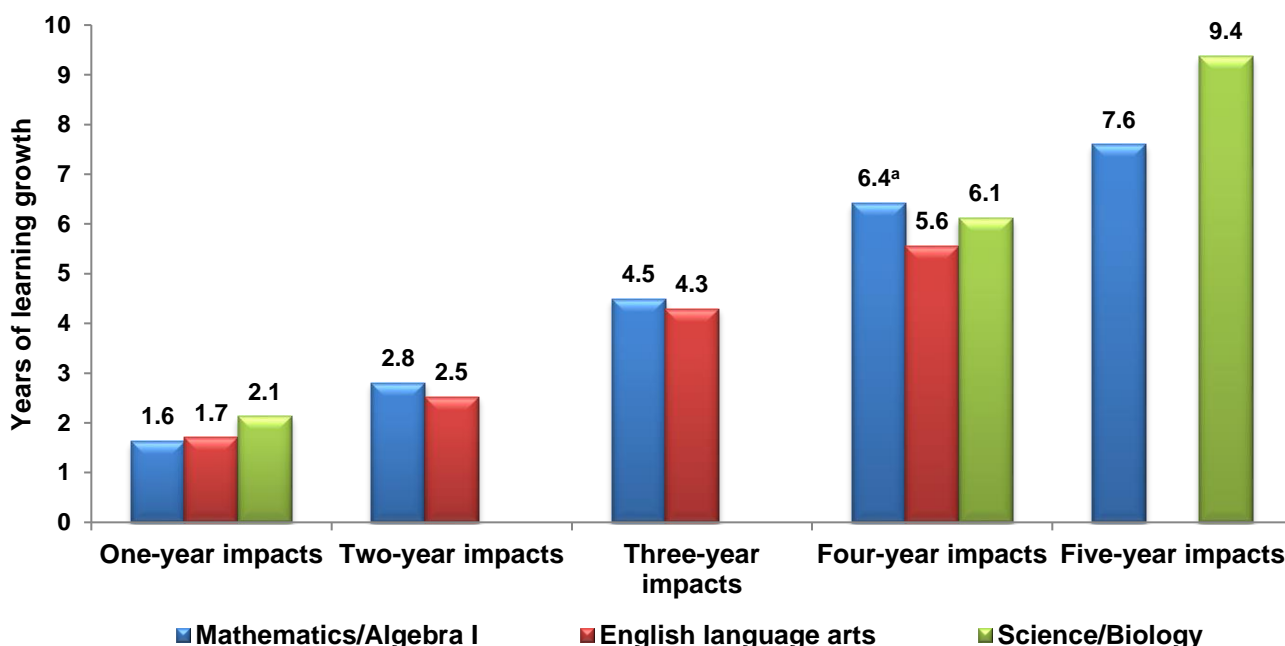
Impacts on mathematics achievement growth. The estimated impact of the Kauffman School on student achievement in mathematics is substantial.² The magnitude of the effect size

¹ The impact of the Kauffman School on student achievement growth is reported in “effect-size” units (fractions of standard deviations of student test scores) that are commonly used in education studies and that allow comparisons to other studies. We measure the average effect that attending the Kauffman School has on student test score growth beyond what students would have achieved if they had attended other Kansas City public schools. A positive effect size means that test score growth is higher for Kauffman students relative to comparison students and vice versa.

² The four-year mathematics impact should be interpreted with caution because not all of the students in the matched comparison group took the 8th-grade MAP; students who were taking Algebra I in 8th grade took a different test. To deal with this problem, we imputed missing 8th-grade mathematics MAP scores for 8th-grade students taking Algebra I. See Section III.A for details on our imputation process. The imputation inherently adds some uncertainty to the exact size of the four-year mathematics impact, but we believe that this approach provides a reasonable approximation.

translates into approximately 4.5 years of learning growth three years after enrollment.³ Before entering the Kauffman School (that is, in 4th grade), the average Kauffman student is at the 35th percentile in the state in mathematics. The results suggest that the average Kauffman student would move to the 60th percentile three years after enrollment in the Kauffman School. Moreover, the three-year mathematics effect is equal to approximately 78 percent of the test score achievement gap between black and white students in 7th grade in Kansas City. The four- and five-year mathematics impact estimates are large as well and are equivalent to approximately 6.4 and 7.6 years of learning growth, respectively.

Figure ES.1. Estimated years of learning growth for Kauffman students



Notes: The conversion presented in this figure assumes that students in the comparison group on average achieve one year of learning growth per year. The five-year impact estimates are based on the Algebra I and biology EOC exams. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no five-year impact for ELA, because no EOC ELA exam is administered to 9th graders.

^a The four-year mathematics impact is based in part on imputed outcome data. See footnote 2 for details.

Impacts on ELA achievement growth. The effect size in ELA is substantial as well; the magnitude translates into approximately 4.3 years of learning growth by the end of the third year after enrollment. The average Kauffman student moves from the 38th percentile in the state in ELA before entering the school to the 55th percentile after three years. This effect is

³ In this report we focus primarily on the three-year impact estimates when discussing the magnitude of the effect of the Kauffman School on student achievement. Three years is the longest duration for which we have impact estimates based on actual (non-imputed) outcome data for both mathematics and ELA for multiple cohorts of Kauffman students. In addition, three-year impact estimates based on grade-level exams are more directly comparable to the results of other charter school effectiveness studies than impacts based on EOC exams. For science, we focus on four-year impacts because no three-year impact estimates is available.

approximately 66 percent of the ELA test score achievement gap between black and white students in 7th grade in Kansas City.

Impacts on science achievement growth. The impact of the Kauffman School in science is also large. Four years after enrolling in the Kauffman School, students achieved approximately 6.1 years of learning in science. The impact is equivalent to approximately 57 percent of the local science test score achievement gap between black and white students in 8th grade. Five years after enrollment, students achieved approximately 9.4 years of learning growth based on biology EOC exam scores. However, the science impact estimates should be interpreted with caution because there was no 4th-grade science exam that could be used in the analysis; instead, we used 4th-grade ELA and mathematics scores as baseline controls.

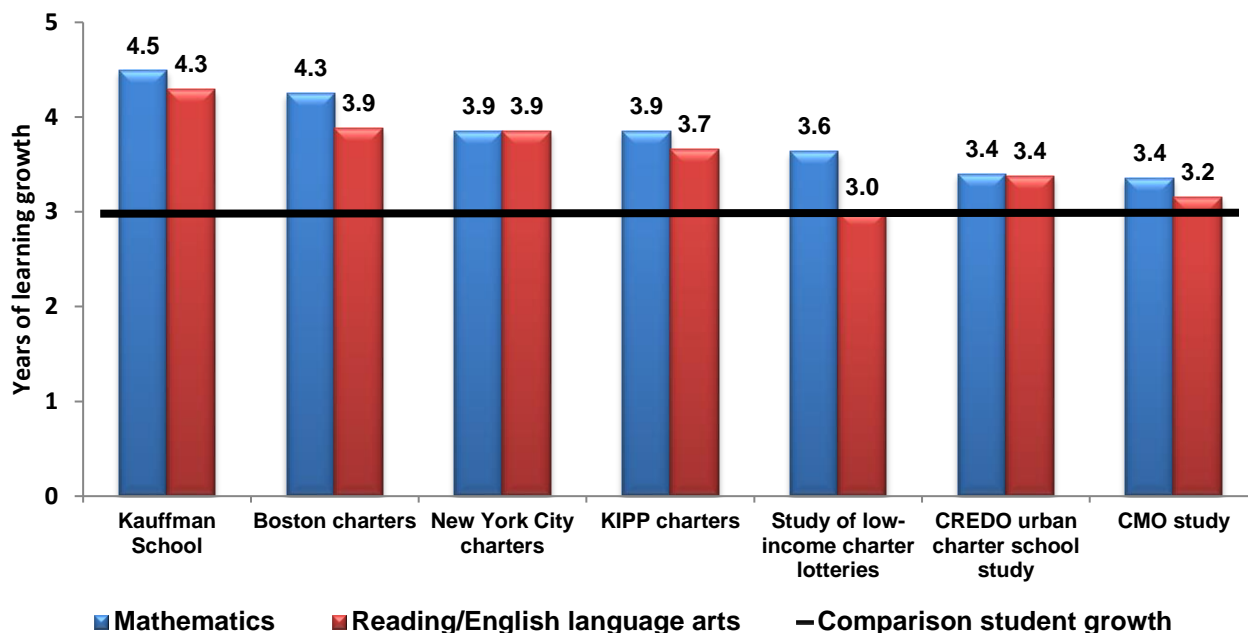
Comparison to other charter schools. The Kauffman School's achievement impacts in mathematics and ELA three years after enrollment are larger than the average effects observed for other highly successful charter school programs (Figure ES.2), including the average Boston charter school analyzed by Abdulkadiroglu et al. (2009), the average Knowledge Is Power Program (KIPP) middle school studied by Tuttle et al. (2013), and the average New York City charter school analyzed by Hoxby et al. (2009) (although some *individual* schools in those studies achieved higher impacts than the Kauffman School).

Moreover, the Kauffman School is strongly outperforming broader samples of charter schools nationwide. The effects of the Kauffman School are substantially greater than those of the average oversubscribed charter school serving a large proportion of low-income students analyzed by Gleason et al. (2010), the average urban charter school in the 41 regions analyzed by the Center for Research on Education Outcomes (CREDO 2015), and the average school in a nationwide group of charter school management organizations (CMOs) studied by Furgeson et al. (2012).

The impact of charter schools on science achievement is less widely reported because most states administer science tests in fewer grades. The Kauffman School, with an estimated four-year effect size of 0.64, is performing well compared to KIPP middle schools, which are estimated to have a cumulative average impact of 0.33 standard deviations in science for students three to four years after enrollment (Tuttle et al. 2013).

In addition, other studies of charter school effectiveness frequently do not report impact estimates on EOC exams. The most comparable five-year impact estimates based on EOC exams for KIPP schools are 0.39 in mathematics and 0.40 in science (Tuttle et al. 2015), which are less than half the size of the Kauffman School's estimated five-year impacts.

Figure ES.2. Charter school three-year impact estimates from various studies represented as years of learning growth⁴



Notes: The figure presents three-year effect-size estimates converted to years of learning growth. This conversion assumes that students in each study's comparison group on average achieve one year of learning growth per year, as indicated by the black horizontal line.

Alternate comparison groups in Kansas City. The main findings summarized here are a result of comparing Kauffman students with a matched comparison group of students from all public schools in Kansas City. We also compared Kauffman students with two subgroups of children—(1) similar students attending district-operated schools in Kansas City and (2) similar students attending other Kansas City public charter schools. The estimated effect sizes are generally higher when we compare the Kauffman School only with district-operated schools and lower when we compare the Kauffman School only with other charter schools. All the effect-size estimates for both comparison groups are positive and significant, indicating that the Kauffman School is outperforming the average public charter school and the average district school in Kansas City in all three tested subjects.

Changes in effectiveness of the Kauffman School over time. We analyzed whether the Kauffman School's impact on student achievement changed during the first five years of school operation. The Kauffman School produced significant positive and stable achievement impacts during its first three years and then substantially accelerated its achievement impacts in Year 4 in

⁴ Effect-size estimates are for the average Boston charter school as reported in Abdulkadiroglu et al. (2009), for the average KIPP charter school analyzed by Tuttle et al. (2013), the average New York City charter school in grades 4 through 8 as reported in Hoxby et al. (2009), the average charter school with a lottery admission process serving a large fraction of low-income students analyzed by Gleason et al. (2010), the average urban charter school in the 41 regions analyzed by the Center for Research on Education Outcomes (CREDO 2015), and the average school in the charter school management organizations (CMO) studied by Furgeson et al. (2012). See Section III.C for further details.

most grades and subjects (Tables ES.2–ES.4). In Year 5, the impacts generally remained near the high level achieved in Year 4. We observed only two statistically significant exceptions to this general trend: in 7th-grade ELA the estimated impact decreased by approximately half in Year 5, and in 5th-grade mathematics the impact nearly doubled. In Chapter VI, we discuss the ways in which key features of the Kauffman School evolved over the school’s first five years of operation and may have contributed to the positive achievement impacts.

Table ES.2. Comparison of mathematics test score impacts across years

	Year 1	Year 2	Year 3	Year 4	Year 5
5th-grade mathematics effect size	0.13	0.15	0.12	0.42**	0.80**
6th-grade mathematics effect size		0.33	0.20	0.43*	0.48
7th-grade mathematics effect size			0.57	0.80*	0.56
8th-grade mathematics effect size				0.96	0.97

*Significantly different from the prior year at the 5 percent level.

**Significantly different from the prior year at the 1 percent level.

Table ES.3. Comparison of ELA test score impacts across years

	Year 1	Year 2	Year 3	Year 4	Year 5
5th-grade ELA effect size	0.06	0.18	0.13	0.44**	0.44
6th-grade ELA effect size		0.18	0.20	0.17	0.21
7th-grade ELA effect size			0.41	0.66*	0.26**
8th-grade ELA effect size				0.53	0.39

*Significantly different from the prior year at the 5 percent level.

**Significantly different from the prior year at the 1 percent level.

ELA = English language arts.

Table ES.4. Comparison of science test score impacts across years

	Year 1	Year 2	Year 3	Year 4	Year 5
5th-grade science effect size	0.40	0.54	0.43	0.52	0.44
8th-grade science effect size				0.66	0.61

State test proficiency goal. One of the goals of the Kauffman School is for at least 75 percent of students enrolled for three consecutive years to score proficient on each state test administered to its students. This is an ambitious goal, as only 36 percent of incoming 5th-grade students from the first three cohorts (the only cohorts that have been enrolled for three years) had achieved at the proficient or advanced levels in mathematics and 38 percent in ELA (Table ES.5). After three consecutive years of enrollment, 63 percent achieved proficient or advanced in

mathematics and 65 percent in ELA.⁵ These calculations are based primarily on students enrolling consecutively in 5th, 6th, and 7th and grade, though students who repeated a grade during their first three years are also included.

Table ES.5. Percentage of Kauffman students scoring proficient or advanced on 7th-grade MAP exams after three years of continuous enrollment

	Proficient/advanced at time of entry	Proficient/advanced after three years of enrollment
Cohort I, II, and III students combined		
Mathematics MAP (%)	36	63
ELA MAP (%)	38	65
Both mathematics and ELA MAP (%)	24	52

Notes: The sample includes 295 Cohort I, Cohort II, and Cohort III students enrolled in the Kauffman School for three consecutive years. Proficiency rates are based on 6th-grade MAP scores for students who repeated a grade during their first three years at the Kauffman School. The scores at time of entry are based on 4th-grade MAP scores for most students, and 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School.

ELA = English language arts

The proficiency rates of Kauffman students continue to increase for students enrolling for four or five years. The first two cohorts of students achieved more than 75 percent proficiency on each state test by the end of their fourth year. By the end of their fifth year of continuous enrollment, more than 90 percent of 9th-grade students achieved proficiency on both the Algebra I and biology EOC exams (Table ES.6).

Table ES.6. Percentage of Kauffman students scoring proficient or advanced on 9th-grade EOC exams after five years of continuous enrollment

	Proficient/advanced at time of entry	Proficient/advanced after five years of enrollment
Algebra I EOC/mathematics MAP (%)	34	94
ELA MAP (%)	26	n.a.
Biology EOC/science MAP (%)	n.a.	92
All available MAP assessments (%)	18	92

Notes: The sample includes 50 Cohort I students who were enrolled at the Kauffman School for five consecutive years. The scores after five years of enrollment are based on 9th-grade EOC exams for 47 students and on 8th-grade MAP exams for 3 students who repeated a grade during their time at the Kauffman School.

ELA = English language arts; n.a. = not applicable

Attendance and suspensions. The Kauffman School had a positive and significant impact on student attendance during the 2015–16 school year, with attendance rates approximately 1 percentage point higher than those of comparison students (Table ES.7).

⁵ It is important to note that the proficiency rates may not be comparable across years, because the state assessments administered in Years 4 and 5 were not the same as those administered in previous years. See Section V.A for details.

Table ES.7. Comparison of impacts of the Kauffman School on attendance and suspensions across years

	2011–12 average	2012–13 average	2013–14 average	2014–15 average	2015–16 average
Attendance rate (%)	-0.83	0.87**	0.72	0.87	0.96
Probability of being suspended (%)	13.4	7.22	24.7**	8.85**	1.72*

Notes: The suspension results are marginal effects from logit models in which the outcome variable is an indicator for receiving a suspension during the year.

*Significantly different from the prior school year's outcomes at the 5 percent level.

**Significantly different from the prior school year's outcomes at the 1 percent level.

During 2015–16, there was a significant decrease in the number of Kauffman students who were suspended relative to previous years, such that the 2015–16 school year is the first year Kauffman students were suspended at a rate that was not significantly higher than comparison students. In Chapter VI, we document changes in the discipline policy and its implementation that may have contributed to the decline in suspensions at the Kauffman School.

Conclusions. The Kauffman School has ambitious goals for its students: accelerated learning and high levels of attendance. An analysis of data from the Kauffman School's first five years shows significant positive impacts on student's academic achievement growth. The Kauffman School exceeded its goal of 1.25 years of learning growth for each year that students are enrolled. Even though the Kauffman School did not meet its ambitious goal of 75 percent of students scoring proficient or advanced on each of the MAP exams after three years, students did reach that mark at the end of their fourth year. And by the end of their fifth year, more than 90 percent of Kauffman Students scored proficient or advanced on the state EOC exams. During 2015–16, students at the Kauffman School had average attendance rates that were approximately one percentage point higher than those of comparison students. The suspension rate at the Kauffman School decreased significantly in Year 5, such that Kauffman students now are suspended at rates that are not significantly different from comparison students.

CONTENTS

EXECUTIVE SUMMARY	III
ACKNOWLEDGEMENTS	XVI
I. INTRODUCTION.....	1
A. Background about the Kauffman School.....	1
B. Characteristics of the Kauffman School	2
II. METHODOLOGY AND DATA	5
A. Methodology	5
B. Data and descriptive statistics	6
1. Data.....	7
2. DESE's data redacting process	7
3. Descriptive statistics: What types of students attend the Kauffman School?.....	8
III. THE IMPACT OF THE KAUFFMAN SCHOOL ON STUDENT ACHIEVEMENT	11
A. Impacts on state test scores.....	11
B. Interpretation of Kauffman School impact estimates.....	14
C. Comparison of Kauffman School estimated impacts to those of other charter schools nationwide.....	17
D. Goal that 75 percent of students score proficient or advanced on MAP exams	19
IV. THE IMPACT OF THE KAUFFMAN SCHOOL ON STUDENT ATTENDANCE AND SUSPENSIONS	23
V. CHANGE IN EFFECTIVENESS OF THE KAUFFMAN SCHOOL OVER TIME	27
A. Changes in achievement impacts across years	27
B. Changes in attendance and suspension impacts across years	31
VI. THE KAUFFMAN SCHOOL'S EVOLUTION ACROSS ITS FIRST FIVE YEARS	33
VII. CONCLUSIONS	43
REFERENCES.....	45
APPENDIX DATA, SAMPLE SELECTION, AND ANALYSIS METHODOLOGY	49

This page has been left blank for double-sided copying.

TABLES

ES.1.	Impact of Kauffman School on student test scores (reported in effect-size units)	iv
ES.2.	Comparison of mathematics test score impacts across years.....	viii
ES.3.	Comparison of ELA test score impacts across years	viii
ES.4.	Comparison of science test score impacts across years	viii
ES.5.	Percentage of Kauffman students scoring proficient or advanced on 7th-grade MAP exams after three years of continuous enrollment	ix
ES.6.	Percentage of Kauffman students scoring proficient or advanced on 9th-grade EOC exams after five years of continuous enrollment	ix
ES.7.	Comparison of impacts of the Kauffman School on attendance and suspensions across years.....	x
III.1.	Impact of Kauffman School on MAP test scores (citywide comparison group)	12
III.2.	Alternate estimates of impact of Kauffman School on MAP test scores (district and charter school comparisons)	13
III.3.	Percentage of Kauffman students scoring proficient or advanced on 7th-grade MAP exams after three years of continuous enrollment	20
III.4.	Percentage of Kauffman students scoring proficient or advanced on 8th-grade MAP exams after four years of continuous enrollment	21
III.5.	Percentage of Kauffman students scoring proficient or advanced on 9th-grade EOC exams after five years of continuous enrollment	22
IV.1.	Attendance and suspension rates for Kauffman and all Kansas City students during 2015–16	24
IV.2.	Impact of Kauffman School on attendance and suspensions during 2015–16	25
V.1.	Comparison of one-year MAP test score impacts: Cohorts I through V 5th graders	28
V.2.	Comparison of two-year MAP test score impacts: Cohorts I through IV 6th graders	28
V.3.	Comparison of three-year MAP test score impacts: Cohort I, II, and III 7th graders	29
V.4.	Comparison of four-year MAP test score impacts: Cohort I and II 8th graders	29
V.5.	Comparison of impacts of the Kauffman School on attendance and suspensions across years.....	32
VI.1.	Evolution of the Kauffman School	34
A.1.	Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort I 9th graders.....	54
A.2.	Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort II 8th graders.....	54

A.3.	Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort III 7th graders	55
A.4.	Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort IV 6th graders	55
A.5.	Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort V 5th graders	56
A.6.	Potential covariates used for propensity-score matching	57
A.7.	Matching information summary	58
A.8.	Baseline 4th-grade average characteristics of matched comparison samples.....	60

FIGURES

ES.1.	Estimated years of learning growth for Kauffman students	v
ES.2.	Charter school three-year impact estimates from various studies represented as years of learning growth.....	vii
III.1.	Estimated years of learning growth for Kauffman students	15
III.2.	Kauffman School three- and four-year impact estimates as a percentage of the local black-white test score gap.....	17
III.3.	Charter school three-year effect-size impact estimates from various studies	18
V.1.	Comparison of mathematics MAP test score impacts across years.....	30
V.2.	Comparison of ELA MAP test score impacts across years	30
V.3.	Comparison of Science MAP test score impacts across years	31

ACKNOWLEDGMENTS

The authors are grateful to Melissa Bardwell, Jason Young, and the Missouri Department of Elementary and Secondary Education for providing the data used in this report. We would like to thank the following Mathematica staff who contributed to the study: Brian Gill provided important feedback on the report, and Ira Nichols-Barrer gave valuable input on the study design. Carol Soble and Daryl Martin edited the report, and Stephanie Barna formatted it. This report includes photographs of sayings posted on the walls of the Ewing Marion Kauffman School taken by Mathematica staff during site visits at the school. The report is based on findings from an evaluation funded by the Ewing Marion Kauffman Foundation.

This page has been left blank for double-sided copying.



I. INTRODUCTION

A. Background about the Kauffman School

For many years, the Kauffman Foundation has focused on improving education for children in Kansas City. Before opening the Kauffman School, the Kauffman Foundation operated several programs that addressed some of the challenges faced in urban education. Such programs included Project Early (an early childhood program), Project Choice (a high school dropout prevention program), and the Kauffman Scholars program (a promise scholarship program). These programs led Foundation leaders to consider the Foundation's possible impact on Kansas City's students through the establishment of a charter school. In March 2009, the Foundation assembled a school design team composed of Foundation education experts and the founding executive director of the Missouri Charter Public School Association.⁶ The team undertook a three-step process of exploration and decision making before establishing the Kauffman School.

Step 1. Analyzing Kansas City's educational landscape. From a review of Kansas City assessment data, the school design team learned that, during the 2008–2009 school year, charter school enrollment accounted for one-third of all public school enrollment in Kansas City (North 2009) and that, among Kansas City's charter and non-charter schools, only 16 percent of middle schools and 7 percent of high schools could claim that at least 50 percent of their students achieved proficient or better on statewide mathematics assessments in 2009 (Richardson 2009).

From the Foundation's perspective, the data suggested that Kansas City's families had a desire for alternatives to the city's traditional public schools and that current charter and non-charter public schools were struggling to help students achieve. In light of students' low academic performance, the Foundation determined that 5th grade was the optimal grade for students to enter its charter school, providing ample time to prepare struggling students for a college preparatory program that would begin in 9th grade.

Step 2. Selecting a location. The Foundation intended that the Kauffman School serve Kansas City's low-income families. From a review of demographic data on Kansas City, the school design team learned that most of the city's low-income population lives in the eastern part

⁶ The design team was composed of Kauffman Foundation associates, Kauffman Scholars program staff, and consultants from various schools and organizations (Ewing Marion Kauffman Foundation 2010).

of the city, yet most of the city's 23 charter schools were located in the western section of the city. In response, the Foundation selected a site in the eastern part of the city. Using data on household income by zip code, the design team identified five sections of the city with high concentrations of low-income families. Students living within these five (since expanded to six) zip codes are given first preference for enrollment.⁷

In August 2013, the Kauffman School moved to its permanent location in the eastern section of the city. The campus encompasses three buildings: a middle school, a high school, and a gymnasium-cafeteria-commons. Design elements of the new buildings reflect the Kauffman School's key values and activities. For example, the new buildings have interior windows to facilitate classroom observations, a central feature of the Kauffman School's professional development model. According to the Kauffman School's website, the interior windows create "an environment that is transparent" and encourage "staff, faculty, parents, and visitors to observe classroom instruction as they walk through the building" (Ewing Marion Kauffman School 2017). The Kauffman School also features teacher workrooms and community spaces for small- and large-group meetings, such as the weekly professional development meetings and community events.

Step 3. Identifying best practices. Before the school opened, the design team made extensive efforts to learn about the best practices of successful charter schools, a process the team described as the "year of learning." The team reviewed research on charter schools and visited successful charter schools in New York, Massachusetts, Illinois, and Wisconsin to learn more about the variables that contributed to the success of those schools.

B. Characteristics of the Kauffman School

The Kauffman School enrolled its first class of 5th graders (about 100 students) in fall 2011 and added a second class of 5th graders (about 100 students) in fall 2012. In fall 2013, a third class of 5th graders joined the Kauffman School (about 200 students). With the opening of its new building, the Kauffman School had sufficient capacity to double the size of the cohort entering in 2013. Each year, the Kauffman School will add a new 5th-grade class of more than 200 students, ultimately resulting in a fully enrolled middle school and high school (grades 5 through 12).

The hallmarks of the Kauffman School include (1) ambitious academic goals, (2) high attendance and behavioral expectations, (3) an extended school day and year, (4) increased time for mathematics and reading instruction, (5) intensive data-driven decision making, (6) extensive teacher professional development, and (7) well-established cultural norms.

1. **Ambitious academic goals.** The Kauffman School expects its students to excel academically and achieve at least 1.25 years of growth in mathematics, science, and reading each year. These goals are discussed regularly by school administrators and staff, teachers,

⁷ The Kauffman School also offers bus transportation for students who live more than one mile away, thereby providing access to the school to students of need across the city. During the Kauffman School's second year of operation, the Foundation identified an additional zip code with a high concentration of low-income students and offered first preference for enrollment to students living in that section of Kansas City as well.

students, and parents. In addition, daily homework, referred to as “life work,” is mandatory, and students are held accountable for turning in their assignments.

2. **High attendance and behavioral expectations.** The Kauffman School has high goals for student attendance (95 percent average daily attendance) and behavior (full observance of school policies and procedures). As a guide for student behavior, teachers implement the SLANT method (Sit up, Listen, Ask and answer questions, Nod your head, Track the speaker) that was developed by the Knowledge Is Power Program (KIPP). Students receive merits for positive behavior and demerits for negative behavior and may serve detention (in or out of school) depending on the number of demerits they earn. The dean of students oversees implementation of the Kauffman School’s behavioral policies. Before the start of each school year, the Kauffman School holds an all-parent meeting to orient incoming students and their families to its high behavioral expectations.
3. **Extended school day and year.** With students coming from Kansas City’s low-performing schools, the design team expected that many children would demonstrate performance below grade level at the time of school entry and would therefore need supplemental instruction to catch up academically before entry into the Kauffman School’s college preparatory program. Thus, the Kauffman School operates an extended school day and year to provide students with additional instructional time. Kauffman students receive approximately five additional weeks of schooling each year compared to what students receive in traditional public school students in Kansas City.
4. **Increased mathematics and reading instructional time.** Each day, the Kauffman School provides its students with a double period of mathematics and three periods of instruction related to ELA, including guided reading.⁸ In Years 2 through 5, all students attended a daily FOCUS class in which they received tutoring and special instruction. Struggling students received additional instruction and practice in any subjects they needed help with, and high-performing students received advanced instruction.
5. **Intensive data-driven decision making.** With its strong emphasis on results, the Kauffman School utilizes a large assessment portfolio that permits teachers and administrators to make data-driven decisions about how best to adapt instruction to meet students’ needs. In addition to teacher-developed “exit tickets,”⁹ quizzes, and tests to measure understanding and academic progress, the Kauffman School’s assessment portfolio includes the following:
 - Achievement Network (ANet) assessments in ELA, mathematics, science, Spanish, and world history, administered every six weeks
 - Strategic Teaching and Evaluation of Progress (STEP) assessments to measure students’ reading growth, administered six times per year

⁸ Guided reading is small-group reading instruction designed to provide differentiated teaching that supports students in developing reading proficiency. The small-group model allows students to be taught in a way that is intended to be more focused on their specific needs, accelerating their progress.

⁹ Exit tickets are short questions or tasks that students complete at the end of the class period. They enable teachers to track the progress of their students’ understanding of the course material on a regular basis.

- Northwest Evaluation Association (NWEA) assessments in mathematics, reading, and science, administered twice a year
 - MAP and EOC standardized tests in mathematics, ELA, and science, administered annually by the state of Missouri
 - ACT Aspire assessment administered in 9th grade to inform lesson planning and assist with preparation for college admission exams
6. **Extensive teacher professional development.** The Kauffman School places considerable emphasis on teachers’ professional development, with teachers participating in (1) a multi-week professional development program focused on curriculum, instruction, and school culture each summer preceding the start of the school year;¹⁰ (2) observations and feedback from administrators multiple times per week; (3) weekly individual coaching sessions; and (4) group-based professional development sessions every Friday afternoon, focused on various topics related to curriculum, instruction, and assessment (Gentile et al. 2014).
7. **Well-established cultural norms.** School administrators noted that “the Kauffman School takes an intentional approach to establishing a culture of shared values that affirm student identity, develop conscious citizens, and maintain high expectations, all in pursuit of its mission: Creating College Graduates” (personal communication April 12, 2017). The Kauffman School makes continuous efforts to communicate explicitly—to all school staff, students, and families—the school’s values, expectations, and norms.

¹⁰ For example, teachers currently participate in two weeks of content and curriculum professional development in June and three weeks of instructional and cultural development in July and August.



II. METHODOLOGY AND DATA

A. Methodology

Comparing Kauffman students to students from other Kansas City schools. Given that all Kauffman students have chosen to enroll in the Kauffman School, they might differ from other Kansas City students in important ways. Therefore, any effort to measure the effect of the Kauffman School on student achievement requires the identification of a comparison group of Kansas City students who, as of 4th grade (before the Kauffman School's 5th-grade entry year), are similar to the students about to enter the Kauffman School. Otherwise, any differences we find in later student outcomes might not be attributable to the effect of the Kauffman School.

To guarantee that the comparison group is similar, the gold standard research design would require a lottery wherein some of the students who apply to the Kauffman School are randomly selected to attend the school and others are randomly denied acceptance to the school. We would then fairly compare the achievement of the two randomly established groups (and assume that any naturally occurring differences among students would be randomly distributed between the two groups). However, the Kauffman School has not been sufficiently oversubscribed; therefore, we cannot adopt this research design. Instead, we turned to the next-best approach. We used data from students across Kansas City to identify a matched comparison group of students who were similar to Kauffman students at the time the Kauffman students enrolled in the school in the 4th grade.

To construct a comparison group of students, we implemented a propensity-score matching procedure. We matched students attending other schools in Kansas City to Kauffman students based on characteristics such as prior test scores, prior attendance, prior suspensions, and demographic characteristics. This approach is a commonly used alternative when random assignment is not possible. In fact, research has shown that the propensity-score matching

procedure produces valid impact estimates that replicate the results of experimental research designs in the context of charter school evaluation (Tuttle et al. 2013; Gill et al. 2015).¹¹

Constituting the Kauffman student group. Throughout our analysis, we classify any student who was enrolled for at least part of his or her 5th-grade year in the Kauffman School as a Kauffman student. Classifying students in this manner defuses the potential criticism that the Kauffman School’s effects are overestimated because low-achieving students have left the charter school. However, the inclusion of these students might lead to understating the impact of the Kauffman School on student achievement because students who left the Kauffman School early would not have experienced its full impact.¹² This conservative analytic approach eliminates the risk of overestimating the impact, but it means that the full impact on students who continue in the Kauffman School for additional years is likely to be underestimated.¹³

Data for our analysis were available for five cohorts of Kauffman students. Cohort I students are those who entered the Kauffman School as 5th graders in 2011–12 (the year the Kauffman School opened). Cohort II students are those who entered as 5th graders in 2012–13, Cohort III students entered in 2013–14, Cohort IV students entered in 2014–15, and Cohort V students entered in 2015–16.

In the next chapter, we present impact estimates by the number of years that have elapsed since students first enrolled in the Kauffman School. The five-year impacts are based on EOC exam scores administered to students in the 2015–16 school year. The Kauffman students in the analysis are mostly 9th-graders from Cohort I, though students in any grade may be included in the EOC exam analysis as long as they are taking the exam for the first time. The four-year impacts are based on 8th-grade MAP exam scores and average the Kauffman School’s impact on Cohort II students (the 8th graders in 2015–16) and its impact on Cohort I students (the 8th graders in 2014–15).¹⁴ The remaining impact estimates are also based on MAP scores and average the effect of the Kauffman School by using data on all available cohorts. For example, the one-year impacts are the average of the Kauffman School’s estimated impact on all five cohorts in their 5th-grade year.

B. Data and descriptive statistics

In this section, we provide details about the data used in our main analysis of the impact of the Kauffman School on student outcomes. We also present a set of descriptive statistics to show

¹¹ See Appendix D for details about implementation of the propensity-score matching procedure.

¹² Only students who entered the Kauffman School in 5th grade are included in the treatment group for this analysis. No new students were admitted in 6th or 7th grade during the Kauffman School’s second and third years of operation. In Year 4, the Kauffman School began “backfilling” open slots in higher grades by admitting new students to those grades. These students are excluded from the analysis because they are not directly comparable to the other Kauffman students.

¹³ Johnson et al. (2016b) provides a more detailed discussion and presents attrition-adjusted impact estimates that approximate the one-year impact of the Kauffman School for 5th-grade students who remain enrolled.

¹⁴ The averages are weighted by the number of Kauffman students in the analysis sample for each cohort. Students who repeated a grade are also included in the calculations. See Appendix A for details.

how Kauffman students compare to students in other public schools in Kansas City with respect to prior achievement and demographic characteristics.

1. Data

The Missouri Department of Elementary and Secondary Education (DESE) provided the data we used in our main analyses. Except for data redacted by DESE, the data included student-level data for all students in Missouri. In the next section, we provide details about DESE's data redacting process.

The data consisted of MAP test scores in mathematics, ELA, and science, along with attendance and suspension data for students in grades 5 through 9 during the 2008–09 through 2015–16 school years. We also obtained data for these students on their demographic characteristics and on their prior (3rd and 4th grade) test scores, attendance, and suspensions. We limited the potential comparison group to students attending schools in the areas served by the Kansas City Public Schools district (KCPS). (See Appendix B for details on the selection process for the analysis sample.)

The main results in this report are based on a matched comparison group selected from all students attending schools within the borders of KCPS, including other charter schools. The impact estimates can therefore be interpreted in terms of how much more or less a Kansas City student would be expected to achieve if that student were to enroll in the Kauffman School rather than a typical Kansas City school. However, given the large number of charter schools serving students in the Kansas City area, a comparison of the Kauffman School's impacts on student achievement to those of other Kansas City charter schools might also be of interest. Thus, we report the results in three ways. We use comparison groups of students from (1) all public schools in Kansas City (the primary impact estimates), (2) district-operated (non-charter) KCPS schools only, and (3) other charter schools within Kansas City only.

For many students, data on one or more of the variables used as baseline controls are missing. About 16 percent of the students we could potentially include in our analysis sample for the most recent year of data are missing data on one or more of the baseline control variables. Instead of dropping them from the analysis, we employed a multiple imputation procedure to estimate their missing baseline values.¹⁵ As a robustness check, we analyzed the data without using imputation and found similar results (results available on request).

2. DESE's data redacting process

Starting with data requests filled in 2016, DESE began redacting observations in which some combination of student demographic or proficiency information could identify a group with fewer than 5 students in a particular grade and school district.¹⁶ The new redacting policy

¹⁵ Appendix C contains details about the imputation procedure.

¹⁶ For example, if there were only four Kauffman students in 5th grade in a given year who were English Language Learner (ELL) students, then all those students would be removed from the data. If instead there were eight ELL Kauffman students, eight Kauffman students with Individualized Education Programs (IEPs), and four Kauffman

led to the removal of between 10 and 30 Kauffman students from each cohort. DESE removed larger numbers of students from the first two cohorts because the starting sample in 5th grade was only about 100 students for Cohorts I and II compared to 200 students for later cohorts.¹⁷

3. Descriptive statistics: What types of students attend the Kauffman School?

Full descriptive statistics for each cohort of Kauffman students compared with students in other Kansas City public schools are presented in Appendix Tables 1 through 5.¹⁸ On average, 4th-grade MAP scores of Kauffman students (prior to entering the Kauffman School) fell below the statewide average in both mathematics and ELA. Students in the Kauffman School came predominantly from low-income and minority families. Among students in the sample across the first five cohorts, at least 80 percent of Kauffman students were eligible for free or reduced-price lunch in 4th grade, and at least 90 percent were black or Hispanic.¹⁹

Although, on average, the Kauffman students performed below the state average on the 4th-grade MAP, they had higher 4th-grade MAP test scores than other students in Kansas City and were less likely to receive any accommodations on the 4th-grade MAP.²⁰ Compared to students in Kansas City, Kauffman students were also more likely to be black, were less likely to be Hispanic, and had slightly higher average 4th-grade attendance rates. In general, differences tended to be larger relative to Kansas City district schools and smaller relative to Kansas City charter schools. However, some differences in the tables are misleading as a result of DESE's data redacting policy. For example, in Table 2, it appears that there are no Kauffman students with disabilities in the second cohort. However, Johnson et al. (2016b) show that, before the data redacting policy was implemented, there were no significant differences in the percentage of disabled students in the Kauffman and Kansas City groups for this cohort.

Given that Kauffman students differed from the average student in Kansas City public schools, we would have observed significant differences in baseline characteristics between Kauffman and comparison students if we included all Kansas City students in the comparison group. These differences could lead to bias in the impact estimates because students who differ with respect to baseline characteristics may be expected to show different rates of growth. We therefore used a matching procedure to ensure that the comparison students were similar to

students who were both ELL and IEP in 5th grade in a given year, then the four students with both characteristics would be redacted, but the other students would remain in the data.

¹⁷ To use the largest sample available for each analysis, we did not re-calculate impacts from previous year using the new redacted data; doing so would likely lead to slightly different effect sizes that are estimated with somewhat less precision.

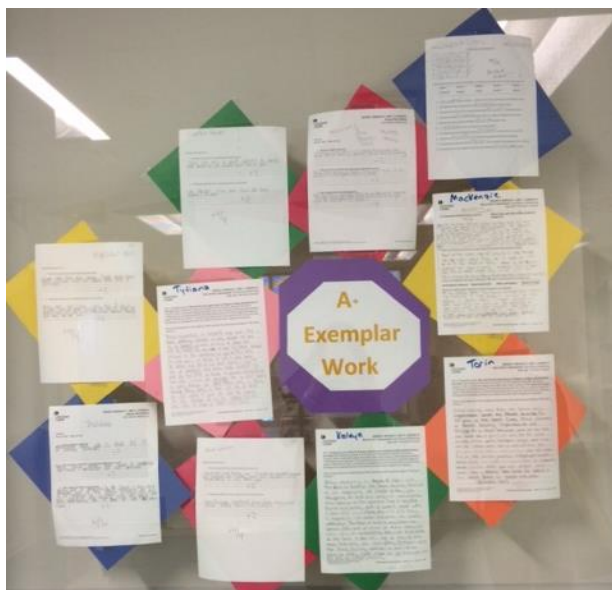
¹⁸ Tables 3 to 5 are more representative of students at the Kauffman School, because fewer students were redacted from the data in Cohorts III and higher due to the larger size of these cohorts. For example, in Table 1, it appears that there were no ELL Kauffman students in Cohort I. There were, in fact, some ELL students in this cohort, but few enough that all these observations were redacted from the DESE data.

¹⁹ For Cohort V Kauffman and comparison students, free lunch status comes from 3rd grade rather than 4th grade. The reason is that both the Kauffman School and KCPS participated in the Community Eligibility Provision meal service option in 2014–15, and free or reduced-price lunch status was not tracked that year.

²⁰ Examples of test accommodations include extended test time, individual testing, and oral reading of test questions.

Kauffman students with respect to baseline characteristics. In Appendix Table 8 we provide descriptive statistics for the matched comparison groups relative to each cohort of Kauffman students. By design, the baseline characteristics between the Kauffman and matched comparison groups exhibit no significant differences. Because we were unable to find a match for all students, the main analysis does not include some Kauffman students. For instance, when creating a comparison group similar to all KCPS students in 2015–16, we were unable to find a match for 10 percent of Kauffman students. As a robustness check, we estimated impacts by using the full sample of Kauffman and comparison students and found similar results (available upon request).

This page has been left blank for double-sided copying.



III. THE IMPACT OF THE KAUFFMAN SCHOOL ON STUDENT ACHIEVEMENT

In this chapter, we report the impact of the Kauffman School on student achievement as measured by EOC exams in Algebra I and biology (five years after enrollment) and MAP exams in mathematics (one to four years after enrollment), ELA (one to four years after enrollment), and science (one year and four years after enrollment). The number of years for which we measure impacts depends on the state's testing regimen in each subject and grade. We describe various ways of interpreting the impact estimates and place the size of the estimates in the context of findings for other evaluations of charter school effectiveness. We also evaluate whether the Kauffman School achieved its goal of 1.25 years of learning growth each year and whether 75 percent of students enrolled for three consecutive years achieve proficient or advanced scores on the MAP exams.

A. Impacts on state test scores

The impact estimates for the Kauffman School on student achievement in each MAP subject are displayed in Table III.1. The results are based on regression models that include the Kauffman students and matched comparison students and control for small remaining differences in prior achievement and other baseline characteristics.²¹ As noted previously, any student who is enrolled in the Kauffman School as a 5th grader for at least part of the school year is included in the Kauffman group for all impact estimates. The impact estimates should therefore be interpreted as the average effect of enrolling in the Kauffman School, accounting for the possibility that students may leave. The results are shown in effect-size units, which can be interpreted as the number of test score standard deviations higher or lower Kauffman students are performing relative to students in the comparison groups (after controlling for baseline

²¹ Appendix Table 6 provides a list of variables included in the model.

achievement).²² Standard errors appear in parentheses below each estimate, and asterisks indicate whether the estimate is significantly different from zero.

Table III.1. Impact of Kauffman School on MAP test scores (citywide comparison group)

	Mathematics/Algebra I	ELA	Science/Biology	Sample size
One-year impact estimates (5th grade)	0.35** (0.03)	0.28** (0.03)	0.45** (0.03)	3,776
Two-year impact estimates (6th grade)	0.39** (0.04)	0.19** (0.03)	n.a.	2,896
Three-year impact estimates (7th grade)	0.63** (0.05)	0.41** (0.05)	n.a.	1,704
Four-year impact estimates (8th grade)	0.96** ^a (0.09)	0.47** (0.06)	0.64** (0.08)	1,207
Five-year impact estimates (9th grade)	0.94** (0.15)	n.a.	1.25** (0.13)	315

Notes: This table displays impact estimates in effect-size units. The first row presents the average one-year impact estimates for Cohorts I through V 5th graders. The second row presents the average two-year impact estimates for Cohorts I through IV 6th graders. The third row presents the average three-year impact estimates of Cohort I, II, and III 7th graders. The fourth row presents the average four-year impact estimates of Cohorts I and II 8th graders. The final row presents the five-year impact estimates for Cohort I (the only cohort that has completed five years in the Kauffman School). Standard errors are displayed in parentheses below each impact estimate. The sample size represents the total number of Kauffman and matched comparison students in each analysis. For the five-year impacts, the sample size is the average of the Algebra I and biology analysis sample sizes.

^a The four-year mathematics impact is based in part on imputed outcome data. See text for details.

**Significantly different from zero at the 1 percent level.

ELA = English language arts; n.a. = not applicable

The first row of Table III.1 shows the amount of additional growth realized by Kauffman students relative to matched comparison students in all other Kansas City public schools one year after enrollment. The numbers represent the average effect-size estimate for the first five cohorts of 5th graders.²³ The one-year impact estimates for the Kauffman School are positive and statistically significant in mathematics, ELA, and science. Caution should be used when interpreting the science estimate, however, because no prior-year science test score was available to use in the propensity-score matching procedure or as a control variable in the regressions. Missouri does not administer a statewide science assessment until 5th grade, so the only baseline test score variables available for use in the analysis of 5th-grade science impacts are prior scores in mathematics and ELA.

²² During the 2015–16 school year, the statewide standard deviations of 8th-grade MAP scores were 49 in mathematics, 52 in ELA, and 33 in science; of 7th-grade MAP scores, 50 in mathematics and 55 in ELA; of 6th-grade MAP scores, 48 in mathematics and 45 in ELA; and of 5th-grade MAP scores, 50 in mathematics, 52 in ELA, and 32 in science. The statewide standard deviations of the EOC exam scores were 19 in Algebra I and 20 in biology.

²³ We estimated the effect sizes separately for each cohort of students. To calculate the impact estimates in Table III.1, we averaged the effect sizes together, weighting by the number of Kauffman students in the analysis sample for each cohort.

The remaining rows of Table III.1 report the estimated effect of the Kauffman School on student achievement two through five years after enrollment. The five-year impact estimates are based on the Algebra I and biology EOC exams. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no five-year impact for ELA because an EOC ELA exam is not administered to all 9th graders. With the exception of the two-year ELA impact estimate, all the impacts increase with longer duration. Collectively, these results demonstrate that the impact of the Kauffman School accumulates for students who are enrolled for multiple years.

Approximately 24 percent of 8th-grade students outside the Kauffman School took the Algebra I EOC exam instead of the 8th-grade mathematics MAP exam. We imputed the missing 8th-grade mathematics MAP test scores for these students by using their other 8th-grade test scores as well as prior mathematics and ELA test scores and demographic characteristics (see Appendix C for details). The four-year mathematics impact estimate should be interpreted with caution, because the imputation procedure may not provide an accurate estimate of these students' 8th-grade mathematics scores. This could occur if advanced students who were likely to do well in mathematics chose to take Algebra I instead of 8th-grade mathematics, and this aptitude for mathematics was not fully captured in the student's 7th-grade mathematics or other test scores.

In Table III.2, we report the results for two alternative comparison groups. The first half of the table shows the effect-size estimates for the Kauffman School compared to district-operated (non-charter) schools in KCPS. The impact estimates in all subjects are greater when this comparison group is used. The second half of Table III.2 presents effect-size estimates for the Kauffman School compared to other charter schools in Kansas City. In this case, the effect-size estimates for the Kauffman School are generally lower, but the estimates remain positive and statistically significant for all durations and subjects. Thus, students at the Kauffman School are showing significantly higher growth than students in other Kansas City charter schools.

Table III.2. Alternate estimates of impact of Kauffman School on MAP test scores (district and charter school comparisons)

	Mathematics/algebra I	ELA	Science/biology	Sample size
Compared to Kansas City district schools				
One-year impact estimates (5th grade)	0.39** (0.03)	0.30** (0.03)	0.50** (0.04)	2,826
Two-year impact estimates (6th grade)	0.39** (0.04)	0.16** (0.04)	n.a.	2,047
Three-year impact estimates (7th grade)	0.65** (0.06)	0.47** (0.05)	n.a.	1,174
Four-year impact estimates (8th grade)	1.05** (0.10)	0.57** (0.07)	0.78** (0.09)	784
Five-year impact estimates (9th grade)	1.08** (0.15)	n.a.	1.34** (0.13)	244
Compared to Kansas City charter schools				
One-year impact estimates (5th grade)	0.34** (0.04)	0.27** (0.03)	0.40** (0.04)	1,744

Table III.2 (*continued*)

	Mathematics/algebra I	ELA	Science/biology	Sample size
Two-year impact estimates (6th grade)	0.36** (0.04)	0.21** (0.04)	n.a	1,308
Three-year impact estimates (7th grade)	0.60** (0.07)	0.37** (0.06)	n.a	834
Four-year impact estimates (8th grade)	0.85** (0.10)	0.34** (0.07)	0.50** (0.09)	670
Five-year impact estimates (9th grade)	0.85** (0.19)	n.a.	1.14** (0.17)	123

Notes: This table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman and matched comparison students in each analysis. For the five-year impacts, the sample size is the average of the Algebra I and biology analysis sample sizes.

**Significantly different from zero at the 1 percent level.

ELA = English language arts; n.a. = not applicable

B. Interpretation of Kauffman School impact estimates

To assist with the interpretation of the effect-size estimates, we converted the effect sizes into three alternative units: (1) years of learning growth, (2) the change in state test score percentile rank for the average Kauffman student, and (3) the effect size as a percentage of the local black-white test score gap.

In this report we focus primarily on the three-year impact estimates when discussing the magnitude of the effect of the Kauffman School on student achievement. This is the longest duration for which we have impact estimates based on actual (non-imputed) outcome data for both mathematics and ELA for several cohorts of Kauffman students. In addition, three-year impact estimates based on grade-level exams are more directly comparable to the results of other charter school effectiveness studies than impacts based on EOC exams.

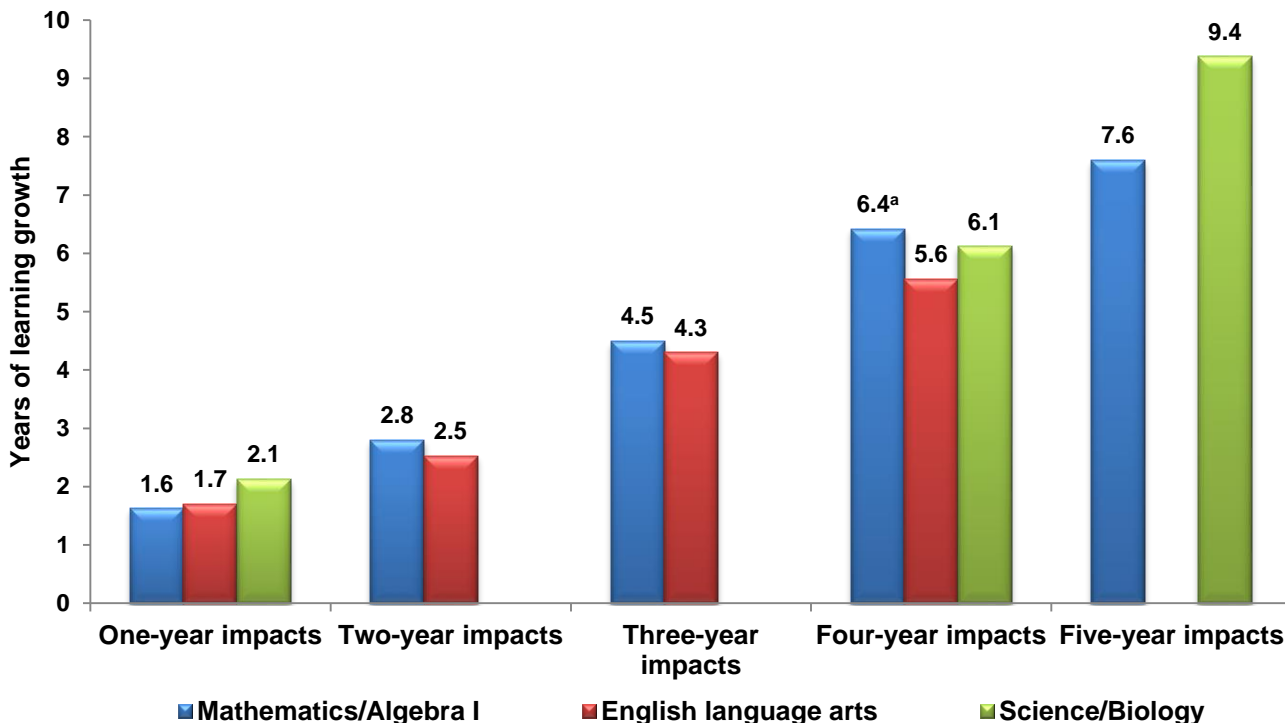
Results as years of learning growth. We can translate the effect sizes presented in the previous section into an approximate measure of the years of additional learning growth experienced by Kauffman students based on results presented in Bloom et al. (2008).²⁴

²⁴ See Gleason et al. (2012), Clark et al. (2013), and Tuttle et al. (2013) for examples of other studies that perform conversions between effect-size estimates and years of learning growth. Using a set of widely administered vertically scaled assessments, Bloom et al. (2008) estimated that the typical 5th grader grows 0.56 standard deviations in mathematics, 0.40 standard deviations in ELA, and 0.40 standard deviations in science. They also estimated that the typical 6th grader grows 0.41 standard deviations in mathematics, 0.32 standard deviations in ELA, and 0.27 standard deviations in science, whereas a typical 7th grader grows 0.30 standard deviations in mathematics, 0.23 standard deviations in ELA, and 0.28 standard deviations in science. A typical 8th grader grows 0.32 standard deviations in mathematics, 0.26 standard deviations in ELA, and 0.26 standard deviations in science. A typical 9th grader grows 0.22 standard deviations in mathematics, 0.24 standard deviations in ELA, and 0.22 standard deviations in science. To convert the one-year impact estimates of the Kauffman School into units of years of learning, we divided the impact estimates by the typical growth of 5th graders in each subject, then added one to represent the annual growth students normally achieve after one year. We used a similar method to convert the two-through five-year impact estimates into years of learning growth. For these results, we divided the impact estimates by the average of the typical growth across all grades included in each analysis, and added the number of school years that elapsed since students enrolled in 5th grade.

Translating the results in this way allows us to evaluate whether the Kauffman School is achieving its goal of producing on average at least 1.25 years of learning growth for students during each year of instruction, or 0.25 years of growth beyond what a typical student would achieve.

Conversion of the impact estimates for the main comparison group yields the results displayed in Figure III.1. The brown horizontal lines show the growth of comparison students, under the assumption that they achieve one year of learning growth each school year. The purple horizontal lines represent the goal of 1.25 years of learning growth per year. The fact that each bars is at or above its corresponding purple line shows that the Kauffman School is achieving the 1.25 years of learning growth goal for all subjects and durations. However, the accuracy of these conversions depends on the extent to which the achievement growth on the MAP exams is similar to the vertically scaled assessments analyzed in Bloom et al. (2008).²⁵ It is also worth noting that the results in Figure III.1 provide a conservative estimate of the years of learning growth achieved by Kauffman students who remain enrolled in the school because students who leave are included in the Kauffman student sample in the analysis. To obtain a more complete picture of the Kauffman School’s progress toward its goal, we also use—in other reports—the results from the NWEA exams and STEP literacy assessments that are administered to Kauffman students. See Johnson and Demers (2016) for details.

Figure III.1. Estimated years of learning growth for Kauffman students



²⁵ If typical achievement growth on the MAP is less than growth on the assessments analyzed in Bloom et al. (2008), then the conversion underestimates the additional years of learning growth achieved by Kauffman students and vice versa.

Figure III.1 (continued)

Notes: The conversion presented in this figure assumes that students in the comparison group on average achieve one year of learning growth per year. The five-year impact estimates are based on the Algebra I and biology EOC exams. There are no two- or three-year estimates for science because the state does not have a science test for 6th or 7th graders. Similarly, there is no five-year impact for ELA, because no EOC ELA exam is administered to 9th graders.

^a The four-year mathematics impact is based in part on imputed outcome data. See footnote 2 for details.

Results as test score percentile ranks. As a second interpretation approach, we report the change in state test score percentile ranks that the average student would likely achieve as a result of enrollment in the Kauffman School versus enrollment in an average Kansas City school. Before entering the Kauffman School, the average Kauffman student in the first through the third cohorts (the only cohorts that have been enrolled for three years) was at the 35th percentile in the state mathematics test score distribution and at the 38th percentile in the state ELA test score distribution in 4th grade. Three years after enrollment at the Kauffman School, the average student moved to the 60th percentile in mathematics and the 65th percentile in ELA.²⁶ On average, Kauffman students moved from substantially below the state average to above the state average three years after enrollment.

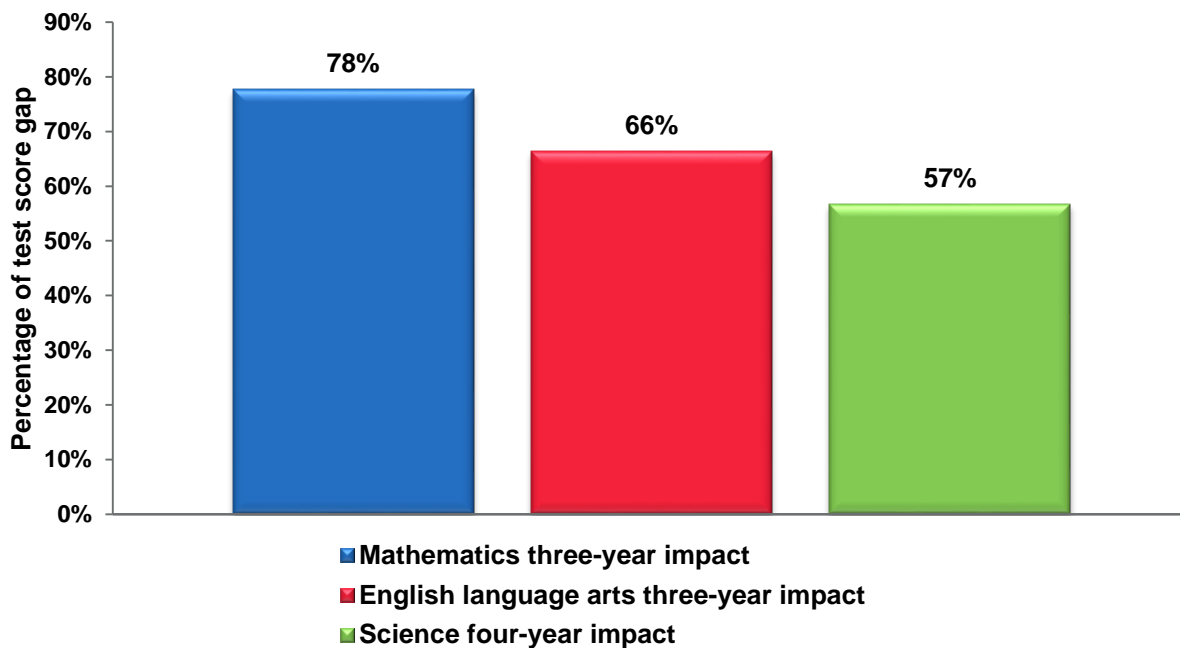
Results as a percentage of local achievement gaps. The Kauffman School effect-size estimates can also be reported as a percentage of the local black-white test score gap (Figure III.2). These percentages provide a sense of how much of the achievement gap is being closed three years after enrollment in the Kauffman School. The three-year impact estimates are equivalent to 78 percent of the 7th-grade black-white test score gap in mathematics and 66 percent of the gap in ELA for Kansas City students.²⁷ The four-year science impact estimate for the Kauffman School is equivalent to 57 percent of the black-white test score gap.²⁸ The results indicate that the Kauffman School is making significant progress toward reducing achievement gaps for minority students.

²⁶ We calculated the percentile ranks three years after enrollment in the Kauffman School by taking the average 4th-grade z -scores of Kauffman students and adding the three-year effect-size estimates. We assumed that the percentile rank of the average student in Kansas City did not change over time.

²⁷ The average 7th-grade mathematics z -score for non-Kauffman black students in Kansas City is -0.772, and the average z -score for white students is 0.039. The corresponding z -scores in ELA are -0.683 for black students and -0.065 for white students. These z -scores are based on test score data from spring 2015, which is the most recent year for which we have non-redacted data from DESE on all black and white students in Kansas City.

²⁸ The average 8th-grade science z -score for non-Kauffman black students in Kansas City is -1.049; the corresponding average z -score for white students is 0.080. These z -scores are also based on data from spring 2015.

Figure III.2. Kauffman School three- and four-year impact estimates as a percentage of the local black-white test score gap

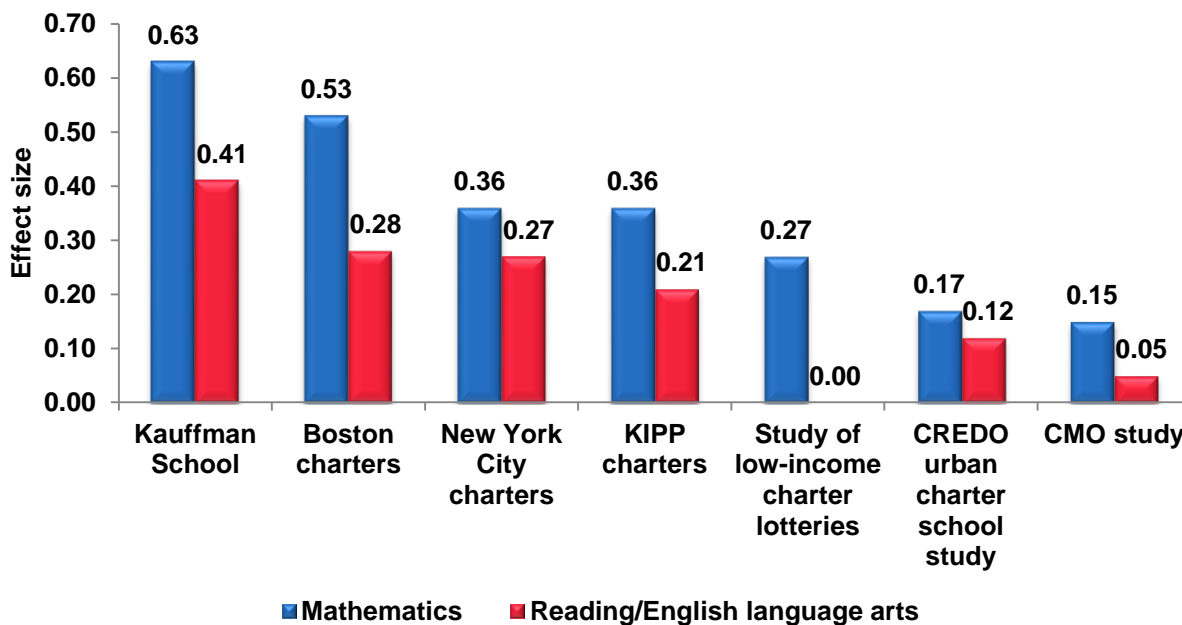


Note: All impact estimates are significantly different from zero.

C. Comparison of Kauffman School estimated impacts to those of other charter schools nationwide

The Kauffman School's main three-year effect-size results (based on the citywide comparison group) are greater than the average impacts estimated for high-performing charter schools in other studies and substantially greater than average impact estimates for charter schools nationwide. Here, we discuss studies of three groups of charter schools widely acknowledged as producing substantial achievement growth for students: Boston, KIPP, and New York City charter schools. We also report the results of three nationwide studies of charter schools that focused on (1) charter schools with admission lotteries, (2) the average urban charter school in 41 regions analyzed by the Center for Research on Education Outcomes (CREDO 2015), and (3) charter school management organizations (CMOs). We summarize the comparisons in Figure III.3.

Figure III.3. Charter school three-year effect-size impact estimates from various studies



Notes: The figure presents three-year effect-size estimates for the average Boston charter school reported in Abdulkadiroglu et al. (2009), the average KIPP charter school analyzed by Tuttle et al. (2013), the average New York City charter school in grades 4 through 8 reported in Hoxby et al. (2009), the average charter school with a lottery admission process serving a large fraction of low-income students analyzed by Gleason et al. (2010), the average urban charter school in the 41 regions analyzed by the Center for Research on Education Outcomes (CREDO 2015), and the average school in the CMOs studied by Furguson et al. (2012).

CMO = charter school management organization; CREDO = Center for Research on Education Outcomes; KIPP = Knowledge Is Power Program.

The estimated impact of the Kauffman School in mathematics and reading is higher than the average impacts of other successful charter school programs. A study of Boston charter schools (Abdulkadiroglu et al. 2009) showed an estimated average three-year effect size of 0.53 in mathematics and 0.28 in reading.²⁹ The results presented by Hoxby et al. (2009) imply average three-year effect sizes of 0.36 in mathematics and 0.27 in reading for New York City charter schools in grades 4 through 8.³⁰ A study of KIPP charter middle schools—widely recognized as high-performing—reported average three-year impact estimates of 0.36 in mathematics and 0.21 in reading (Tuttle et al. 2013). The Kauffman School is estimated, on average, to have larger impacts on student achievement than these high-performing charter school programs. It is important to note that, in Figure III.3, we present the *average* impacts of the charter schools in

²⁹ We generally obtained the three-year impact estimates by tripling the average annual impact estimates reported by the authors. The exceptions are the KIPP study, the CMO study, and the charter lottery study. In the KIPP and CMO studies, the authors reported three-year impact estimates separately from one-year estimates. The three-year impact estimates for the charter lottery study were obtained by increasing the two-year estimates by 50 percent.

³⁰ The estimated impacts of New York City charter schools on the lower grades of elementary schools are smaller than in grades 4 through 8. When lower elementary school grades are included in the calculations, the average three-year impact estimates for New York City charter schools are 0.27 in mathematics and 0.18 in ELA.

these groups. Some individual schools or subsets of these groups may have greater estimated impacts than the Kauffman School. For example, the three-year impact estimates for oversubscribed Boston charter middle schools analyzed in Abdulkadiroglu et al. (2009) are equivalent to 0.51 standard deviations in reading and 1.6 standard deviations in mathematics.

The achievement growth of students at the Kauffman School is substantially higher than the average growth of students in broader samples of charter schools nationwide (Figure III.3). Gleason et al. (2010) analyzed a sample of oversubscribed charter middle schools with lottery admission processes. The results demonstrate an average three-year impact estimate of 0.27 in mathematics and zero in reading for charter schools serving a large fraction of low-income students.³¹ Across urban charter schools in the 41 regions included in the Center for Research on Education Outcomes (CREDO) analysis, the average impact was 0.17 in mathematics and 0.12 in reading (CREDO 2015). The average charter school in the CMOs analyzed by Furgeson et al. (2012) achieved an estimated three-year effect size of 0.15 in mathematics and of 0.05 in reading.

Given the limited data on science achievement relative to data on mathematics and reading achievement, few studies of charter school effectiveness report impact estimates in science.³² The Kauffman School's estimated four-year science impact compares favorably to the science impacts of KIPP middle schools, which are estimated to achieve a cumulative average impact of 0.33 standard deviations in science for students three to four years after enrollment (Tuttle et al. 2013).

Impact estimates on EOC exams are also not frequently reported in other studies of charter school effectiveness. The most comparable five-year impact estimates based on EOC exams for KIPP schools are 0.39 in mathematics and 0.40 in science (Tuttle et al. 2015), which are less than half the size of the Kauffman School's estimated five-year impacts.³³

D. Goal that 75 percent of students score proficient or advanced on MAP exams

One goal of the Kauffman School is that at least 75 percent of students enrolled for three consecutive years score in the proficient or advanced performance range on each state test administered to its students. The proficiency rates of the first three cohorts (the only cohorts that

³¹ Gleason et al. (2010) report negative but statistically insignificant impact estimates based on the full set of charter schools in their sample (not just those serving low-income students).

³² Hoxby et al. (2009) report average annual impacts of 0.23 standard deviations in science for New York City charter schools in grades 5 through 8. However, they estimated the impact with a large standard error, and the impact is not statistically significant (p value = 0.14). Multiplying the annual impact estimate by four would therefore be unlikely to provide a meaningful comparison with the four-year science impact of the Kauffman School.

³³ Results from this analysis are reported in the appendix of Tuttle et al. (2015) and include only students who remained continuously enrolled in KIPP schools. The impacts are therefore likely to be overstated.

have been enrolled for three years) are summarized in the first section of Table III.3.³⁴ The first column displays the percentage of these students who scored proficient or advanced on the MAP exams taken in the spring before they entered the Kauffman School (i.e., in 4th grade). This column provides an indication of how ambitious the 75 percent goal is, as only 36 percent of incoming students in Cohort I through III had achieved proficient or advanced in mathematics and 38 percent in ELA on their prior-year MAP exams.

The Kauffman School did not meet its goal of 75 percent of students achieving at the proficient or advanced levels after three years of consecutive enrollment. Among students who were enrolled in the Kauffman School for three consecutive years, 63 percent achieved proficient or advanced on the mathematics and 65 percent on the ELA MAP exams. These calculations are based primarily on students enrolling consecutively in 5th, 6th, and 7th and grade, though students who repeated a grade during their first three years are also included. To provide additional detail about the progress that Kauffman students made toward the 75 percent goal, we report the results separately for Cohort I, Cohort II, and Cohort III students.

Table III.3. Percentage of Kauffman students scoring proficient or advanced on 7th-grade MAP exams after three years of continuous enrollment

	Proficient/advanced at time of entry	Proficient/advanced after three years of enrollment
Cohort I, II, and III students combined		
Mathematics MAP (%)	36	63
ELA MAP (%)	38	65
Both mathematics and ELA MAP (%)	24	52
Sample size	274	295
Cohort I students		
Mathematics MAP (%)	32	69
ELA MAP (%)	30	55
Both mathematics and ELA MAP (%)	20	51
Sample size	74	74
Cohort II students		
Mathematics MAP (%)	45	68
ELA MAP (%)	44	78
Both mathematics and ELA MAP (%)	32	62
Sample size	66	78
Cohort III students		
Mathematics MAP (%)	34	58
ELA MAP (%)	39	63
Both mathematics and ELA MAP (%)	23	46

³⁴ The results from this analysis are based only on data obtained from the Kauffman School, so no students were removed from the sample because of DESE's data redaction policy. It is important to note that the proficiency rates may not be comparable across years, because the state assessments administered in Years 4 and 5 were not the same as those administered in previous years. See section V.A for details.

Table III.3 (continued)

Sample size	134	143
Notes:	The sample includes 295 Cohort I, Cohort II, and Cohort III students enrolled in the Kauffman School for three consecutive years. The scores at time of entry are based on 4th-grade MAP scores for most students, and 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. Twelve Cohort II and 9 Cohort III students are missing baseline MAP exam scores. The scores after three years of enrollment are based on 7th-grade MAP exams for 281 students and 6th-grade MAP exams for 14 students who repeated a grade while at the Kauffman School.	

ELA = English language arts

Table III.4 shows the percentage of Kauffman students scoring proficient or advanced in 8th grade after four years of continuous enrollment. The Kauffman School achieved 75 percent proficiency on each state test for these students, with 84 percent scoring proficient or better in mathematics, 79 percent in ELA, and 82 percent in science. Overall, 67 percent of students reached proficiency on all three exams after four years of enrollment.

Table III.4. Percentage of Kauffman students scoring proficient or advanced on 8th-grade MAP exams after four years of continuous enrollment

	Proficient/advanced at time of entry	Proficient/advanced after four years of enrollment
Cohort I and II students combined		
Mathematics MAP (%)	38	84
ELA MAP (%)	33	79
Science MAP (%)	n.a.	82
All available MAP assessments (%)	23	67
Sample size	111	122
Cohort I students		
Mathematics MAP (%)	32	81
ELA MAP (%)	27	76
Science MAP (%)	n.a.	78
All available MAP assessments (%)	19	66
Sample size	59	59
Cohort II students		
Mathematics MAP (%)	44	86
ELA MAP (%)	40	81
Science MAP (%)	n.a.	85
All available MAP assessments (%)	27	68
Sample size	52	63

Notes: The sample includes 122 Cohort I and Cohort II students enrolled in the Kauffman School for four consecutive years. The scores at time of entry are based on 4th-grade MAP scores for most students and on 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. Eleven Cohort II students are missing baseline MAP exam scores. The scores after four years of enrollment are based on 8th-grade MAP exams for 114 students and on 7th-grade MAP exams for 8 students who repeated a grade when they were enrolled in the Kauffman School. These 8 students are included in the calculation of overall proficiency rates in the first row of the table, with results based only on mathematics and ELA scores, because 8th-grade science MAP scores were not available for them.

ELA = English language arts; n.a. = not applicable

Table III.5 displays the percentage of Kauffman students scoring proficient or advanced in 9th grade after five years of continuous enrollment. Nearly all students who remain in the Kauffman School for five years achieved proficient or advanced on the available EOC exams: 94 percent are proficient in Algebra I, and 92 percent are proficient in biology.³⁵

Table III.5. Percentage of Kauffman students scoring proficient or advanced on 9th-grade EOC exams after five years of continuous enrollment

	Proficient/advanced at time of entry	Proficient/advanced after five years of enrollment
Algebra I EOC/mathematics MAP (%)	34	94
ELA MAP (%)	26	n.a.
Biology EOC/science MAP (%)	n.a.	92
All available MAP assessments (%)	18	92
Sample size	50	50

Notes: The sample includes 50 Cohort I students who were enrolled at the Kauffman School for five consecutive years. The scores at the time of entry are based on 4th-grade MAP scores for most students and on 3rd- or 5th-grade MAP scores for students who skipped or repeated a grade when they joined the Kauffman School. The scores after five years of enrollment are based on 9th-grade EOC exams for 47 students and on 8th-grade MAP exams for 3 students who repeated a grade during their time at the Kauffman School. These 3 students are included in the calculation of overall proficiency rates; the results are based on 8th-grade mathematics, science, and ELA scores.

ELA = English language arts; n.a. = not applicable

³⁵ For three students who were enrolled for five years but repeated a grade, we used their 8th-grade MAP scores in place of the EOC exam scores to calculate the proficiency rates.



IV. THE IMPACT OF THE KAUFFMAN SCHOOL ON STUDENT ATTENDANCE AND SUSPENSIONS

In this chapter, we present the impacts of the Kauffman School on student attendance and suspensions during the 2015–16 school year. It is important to note that the analysis of suspensions cannot distinguish effects driven by differences in student behavior from effects driven by differences in the enforcement of school policies or reporting practices. If Kauffman students are more likely than students in other schools to be suspended, the suspensions could reflect a greater frequency of infractions among Kauffman students or the Kauffman School’s issuance of suspensions for behaviors that differ from those considered infractions in other Kansas City schools.

The set of comparison students used to analyze attendance and suspension outcomes is the same set used to analyze MAP achievement in Chapter III. We also used the same set of baseline control variables, including 4th-grade attendance and suspension information. We analyzed the attendance and suspension outcomes separately by cohort and by grade to highlight differences that arise over time and across grades. The state of Missouri collects suspension data separately for in-school suspensions and out-of-school suspensions. For the initial suspension analysis, we combined these data into one variable, indicating whether a student received either type of suspension. Our aim in combining these data was to create a variable that would be as comparable as possible across schools, because different schools have different standards for the types of disciplinary infractions that warrant in-school and out-of-school suspensions. To provide additional information on the source of the Kauffman School suspension impacts, we present separate results where indicators for ever receiving an in-school or out-of-school suspension are used as outcome variables. (Appendix A provides further detail on the construction of the attendance and suspension variables.)

The distribution of suspensions is skewed, with the majority of students receiving no suspensions. To simplify the analysis for the main suspension impact results, our outcome of interest is whether a student ever received a suspension during the year.³⁶ Before presenting the impact estimates for the Kauffman School, we present descriptive statistics about attendance and suspensions at the Kauffman School and other schools in Kansas City during the 2015–16 school year (Table IV.1).

Table IV.1. Attendance and suspension rates for Kauffman and all Kansas City students during 2015–16

	Kauffman students	Kansas City students
5th graders (Cohort V)		
Attendance rate (%)	96.8 (3.6)	95.0 (4.5)**
One or more suspensions (%)	19.0 (39.4)	18.6 (38.9)
One or more in-school suspensions (%)	5.5 (22.9)	11.6 (32.0)**
One or more out-of-school suspensions (%)	16.0 (36.7)	12.2 (32.8)
Sample size	163	1,424
6th graders (Cohort IV)		
Attendance rate (%)	95.1 (4.6)	94.6 (4.9)
One or more suspensions (%)	36.1 (48.2)	24.7 (43.2)**
One or more in-school suspensions (%)	20.7 (40.6)	15.3 (36.1)
One or more out-of-school suspensions (%)	24.9 (43.3)	16.5 (37.2)*
Sample size	169	1,258
7th graders (Cohort III)		
Attendance rate (%)	95.7 (4.1)	93.9 (5.6)**
One or more suspensions (%)	43.2 (49.7)	35.3 (47.8)
One or more in-school suspensions (%)	29.5 (45.8)	24.3 (42.9)
One or more out-of-school suspensions (%)	25.0 (43.5)	21.2 (40.9)
Sample size	132	1,229
8th graders (Cohort II)		
Attendance rate (%)	95.3 (3.9)	93.4 (6.4)**
One or more suspensions (%)	38.6 (49.1)	36.8 (48.2)
One or more in-school suspensions (%)	22.8 (42.3)	26.5 (44.1)
One or more out-of-school suspensions (%)	24.6 (43.4)	23.9 (42.6)
Sample size	57	1,224
9th graders (Cohort I)		
Attendance rate (%)	93.4 (7.7)	91.2 (8.8)*
One or more suspensions (%)	50.0 (50.4)	37.9 (48.5)
One or more in-school suspensions (%)	40.6 (49.5)	30.2 (45.9)
One or more out-of-school suspensions (%)	26.6 (44.5)	22.4 (41.7)
Sample size	64	1,337

³⁶ Because the suspension outcome is a binary rather than a continuous variable, we use a logit model in place of the linear regression to implement the analysis.

Table IV.1 (continued)

	Kauffman students	Kansas City students
Average across grades		
Attendance rate (%)	95.5 (4.6)	94.1 (5.7)**
One or more suspensions (%)	34.7 (46.6)	28.0 (44.3)**
One or more in-school suspensions (%)	20.9 (39.2)	19.0 (38.7)
One or more out-of-school suspensions (%)	22.6 (41.8)	17.7 (38.0)**
Sample size	585	6,472

Notes: Standard deviations are presented next to means in parentheses. The bottom section of the table displays the average across grade levels, weighted by the number of Kauffman students in each grade. Students who repeated a grade are included in the same sample as the other students in their cohort.

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

The average attendance rate of Kauffman students across all grades was significantly higher than that of other Kansas City students. The Kauffman School also suspended students at a significantly higher rate during 2015–16 as compared to other schools in Kansas City. However, the descriptive statistics presented in Table IV.1 are based on the full sample of Kauffman and Kansas City students in grades 5 through 9 during 2015–16. Given that different types of students attend the Kauffman School versus other Kansas City schools, the numbers are not representative of the Kauffman School’s impact on attendance and suspensions. In Table IV.2, we present the estimated impacts based on the sample of matched comparison students.

Table IV.2. Impact of Kauffman School on attendance and suspensions during 2015–16

	5th graders	6th graders	7th graders	8th graders	9th graders	2015–16 average
Attendance rate (%)	1.63** (0.33)	0.19 (0.42)	1.21* (0.50)	0.56 (0.61)	1.24 (0.93)	0.96** (0.22)
Probability of being suspended (%)	-4.56 (3.9)	4.25 (4.8)	2.68 (5.3)	3.38 (7.5)	6.88 (6.4)	1.72 (2.4)
Probability of in-school suspension (%)	-9.77** (3.2)	0.77 (4.0)	3.04 (5.0)	-0.86 (7.1)	4.88 (6.6)	-1.29 (2.1)
Probability of out-of-school suspension (%)	2.17 (4.0)	5.31 (4.2)	-0.34 (4.9)	1.77 (6.5)	4.38 (5.4)	2.79 (2.2)
Sample size	820	691	590	459	596	3,156

Notes: The suspension results are marginal effects from logit models in which the outcome variable is an indicator for receiving a suspension during the year. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis. The sixth column represents a weighted average (by the number of Kauffman students) of the impacts across grade levels.

*Significantly different from zero at the 5 percent level.

**Significantly different from zero at the 1 percent level.

Impact on attendance. The results show that, during the 2015–16 school year, the Kauffman School overall had a positive and statistically significant impact on the attendance rate of its students. The magnitude of the coefficient indicates that, on average, Kauffman students had an attendance rate 0.96 percentage points higher than that of other similar students in Kansas

City. The estimated impact is positive in all grades but is statistically significant only for 5th and 7th graders (as well as for all grades combined).³⁷

Impact on suspensions. The estimated suspension impacts for the Kauffman School are not significantly different from zero, which indicates that Kauffman students are not more likely to be suspended than similar students in Kansas City. This is true for all grades and for both in-school and out-of-school suspension except for the 5th grade, in which Kauffman students were approximately 10 percentage points less likely to receive at least one out-of-school suspension during the year. It is noteworthy that 2015–16 was the first year since the opening of the Kauffman School that its students were not more likely to receive suspensions relative to comparison students. We discuss this in more detail in the next chapter.

When interpreting the suspension impact estimates for the Kauffman School, it is important to note that the impact estimates do not necessarily represent differences in the number of behavioral infractions committed by Kauffman students. The estimates could also be affected by discipline policies at the Kauffman School that may differ from other schools and the longer school day and school year at the Kauffman School, which provide more opportunities for suspensions to be issued.

³⁷ Caution should be used when interpreting the statistical significance of the grade-level results in Table IV.2. Because 20 statistical tests are being performed, it is likely that one grade-level impact would be significant due to random chance.



V. CHANGE IN EFFECTIVENESS OF THE KAUFFMAN SCHOOL OVER TIME

The Kauffman School has completed five full years of operation: 2011–12 through 2015–16. We can use the impacts estimated during each year to examine whether the performance of the Kauffman School has changed over time. In this chapter, we present the changes in impacts on achievement, attendance, and suspensions during the Kauffman School’s first five years of operation. In the following chapter, we describe changes in the policies and practices of the Kauffman School that may have contributed to the changes in impacts.

A. Changes in achievement impacts across years

Table V.1 compares the estimated one-year (5th grade) Kauffman School impacts for Cohorts I through V. Tables V.2, V.3, and V.4 display the corresponding comparisons of impacts for 6th, 7th, and 8th graders across years. Figures V.1 through V.3 display the same results graphically for each subject by year. If we look across these tables and figures, a clear pattern emerges: although there is no evidence of any statistically significant changes in impacts over the first three years of the school’s operation, impacts for the fourth year (2014–15) exceed those for the preceding years in most of the mathematics and ELA comparisons. Impacts were higher in 2014–15 relative to 2013–14 in all grades and subjects except 5th-grade science and 6th-grade ELA.

In Year 5 (2015–16), the estimated achievement impacts were generally similar to those in Year 4. The only significant differences relative to Year 4 were in 7th-grade ELA in which the estimated impact decreased by approximately half and in 5th-grade mathematics in which the estimated impact nearly doubled. The magnitude of the one-year 5th-grade mathematics impact in 2015–16 is especially noteworthy because the value of 0.80 is larger than all previously estimated one- or two-year impacts of the Kauffman School.

Even though the Kauffman School was producing significant achievement impacts in earlier years, it appears to have substantially accelerated its achievement impacts in Year 4 and to have generally maintained these higher impact levels in Year 5. The significant increase in estimated impacts across grades and subjects in Years 4 and 5 may be related to the change in standards

tested on the MAP exams during those years. In Year 4, Missouri administered a new standardized test that aligned with the Common Core State Standards and was provided by the Smarter Balanced Assessment Consortium. In Year 5, Missouri discontinued its association with Smarter Balanced and used a different test provider as it developed new learning standards.

Even before Year 4, the Kauffman School had already changed its curricula to align with the Common Core standards, which likely positioned students to perform well on the new state tests. It is also possible that the particularly strong impacts in Years 4 and 5 were related to other factors, such as improved teacher or school effectiveness. Since its founding, the Kauffman School has implemented many educational practices that, according to the research literature, foster students' academic achievement, including a strong culture, a rigorous curriculum, increased instructional time, a dedicated teacher professional development program, and strong school leaders (Johnson et al. 2016a). In Chapter VI, we discuss the ways in which these features of the Kauffman School evolved over the school's first five years of operation and may have contributed to the positive achievement impacts.

Table V.1. Comparison of one-year MAP test score impacts: Cohorts I through V 5th graders

	Cohort I 5th graders (2011–12)	Cohort II 5th graders (2012–13)	Cohort III 5th graders (2013–14)	Cohort IV 5th graders (2014–15)	Cohort V 5th graders (2015–16)
5th-grade mathematics effect size	0.13 (0.06)	0.15 (0.07)	0.12 (0.04)	0.42** (0.06)	0.80** (0.07)
5th-grade ELA effect size	0.06 (0.07)	0.18 (0.06)	0.13 (0.04)	0.44** (0.06)	0.44 (0.05)
5th-grade science effect size	0.40 (0.07)	0.54 (0.07)	0.43 (0.04)	0.52 (0.07)	0.40 (0.06)
Sample size	677	617	948	714	820

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

**Significantly different from the prior cohort at the 1 percent level.

ELA = English language arts

Table V.2. Comparison of two-year MAP test score impacts: Cohorts I through IV 6th graders

	Cohort I 6th graders (2012–13)	Cohort II 6th graders (2013–14)	Cohort III 6th graders (2014–15)	Cohort IV 6th graders (2015–16)
6th-grade mathematics effect size	0.33 (0.08)	0.20 (0.07)	0.43* (0.06)	0.48 (0.07)
6th-grade ELA effect size	0.18 (0.07)	0.20 (0.07)	0.17 (0.06)	0.21 (0.06)
Sample size	596	585	1,024	691

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior cohort at the 5 percent level.

ELA = English language arts.

Table V.3. Comparison of three-year MAP test score impacts: Cohort I, II, and III 7th graders

	Cohort I 7th graders (2013–14)	Cohort II 7th graders (2014–15)	Cohort III 7th graders (2015–16)
7th-grade mathematics effect size	0.57 (0.07)	0.80* (0.09)	0.56 (0.09)
7th-grade ELA effect size	0.41 (0.08)	0.66* (0.09)	0.26** (0.07)
Sample size	534	580	590

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior cohort at the 5 percent level.

**Significantly different from the prior cohort at the 1 percent level.

ELA = English language arts

Table V.4. Comparison of four-year MAP test score impacts: Cohort I and II 8th graders

	Cohort I 8th graders (2014–15)	Cohort II 8th graders (2015–16)
8th-grade mathematics effect size	0.96 (0.10)	0.97 (0.15)
8th-grade ELA effect size	0.53 (0.08)	0.39 (0.10)
8th-grade science effect size	0.66 (0.10)	0.61 (0.11)
Sample size	748	459

Notes: The table displays impact estimates in effect-size units. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

ELA = English language arts

Figure V.1. Comparison of mathematics MAP test score impacts across years

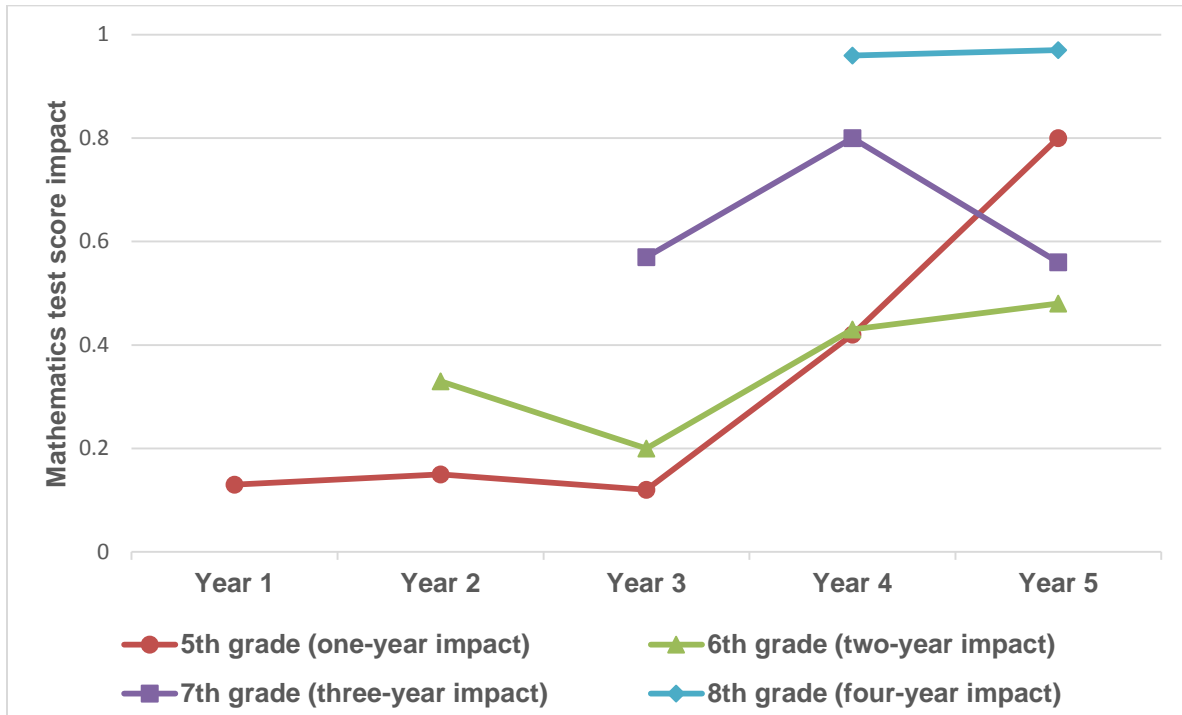


Figure V.2. Comparison of ELA MAP test score impacts across years

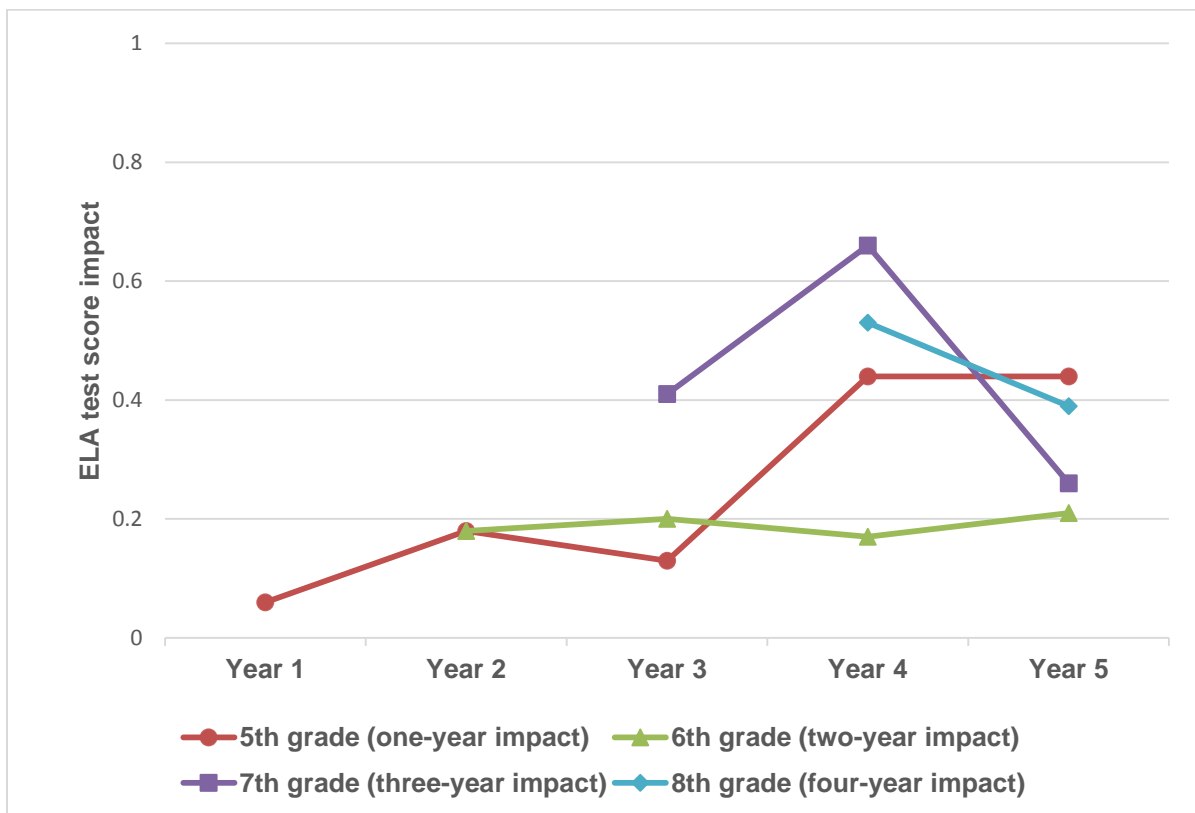


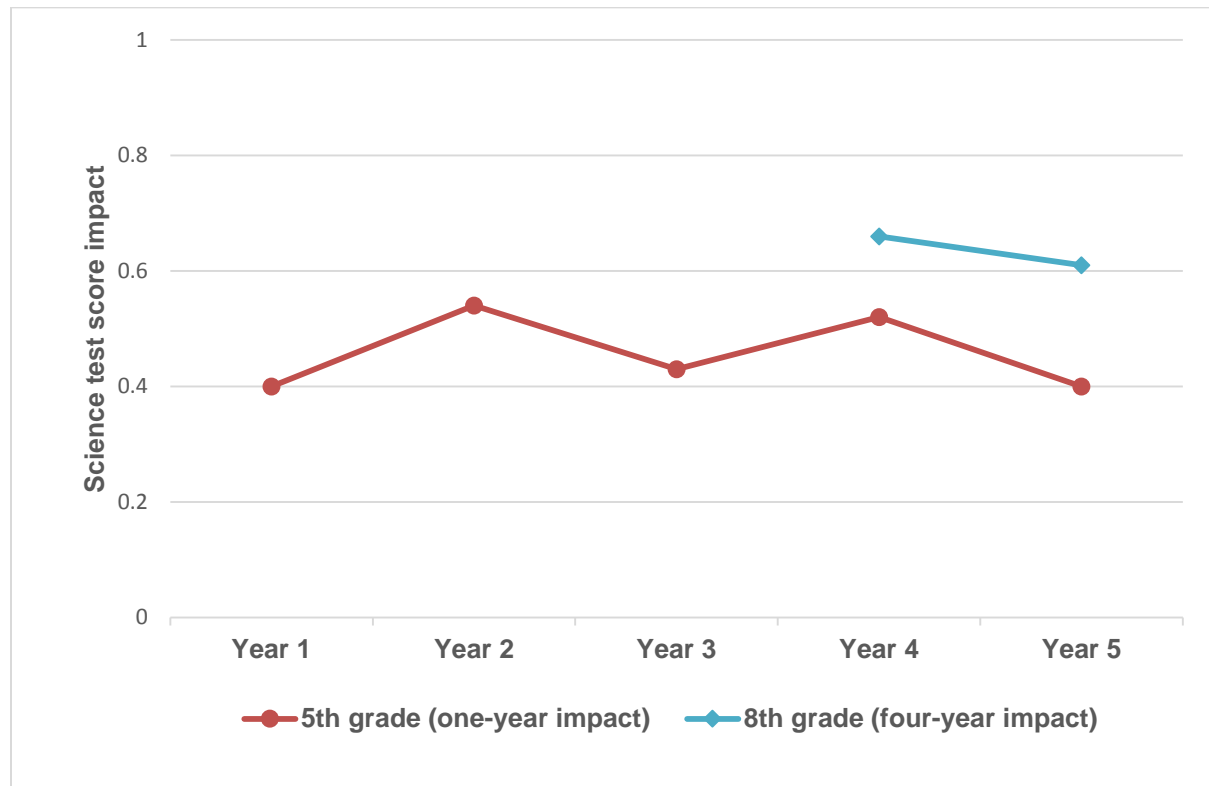
Figure V.3. Comparison of Science MAP test score impacts across years**B. Changes in attendance and suspension impacts across years**

Table V.5 compares the schoolwide attendance and suspension impacts for each year of the Kauffman School's operation. Since 2012–13, the Kauffman School has had a consistent positive impact on student attendance rates of a little less than one percentage point. The impacts on suspension rates were significantly lower in 2014–15 compared with the previous year, and they decreased significantly again in 2015–16. As noted in the previous chapter, 2015–16 was the first year since the opening of the Kauffman School that its students were not more likely to receive suspensions relative to comparison students. In the next chapter, we discuss changes in the Kauffman School's discipline policies and implementation that may have contributed to the decline in suspensions.

Table V.5. Comparison of impacts of the Kauffman School on attendance and suspensions across years

	2011–12 average	2012–13 average	2013–14 average	2014–15 average	2015–16 average
Attendance rate (%)	-0.83 (0.48)	0.87** (0.31)	0.72 (0.27)	0.87 (0.23)	0.96 (0.22)
Probability of being suspended (%)	13.4 (5.2)	7.22 (3.5)	24.7** (2.6)	8.85** (2.4)	1.72* (2.4)
Probability of in-school suspension (%)	0.27 (3.9)	-1.27 (2.2)	24.8** (2.6)	10.5** (2.1)	-1.29** (2.1)
Probability of out-of- school suspension (%)	14.2 (4.7)	8.97 (3.4)	16.6 (2.8)	4.51** (2.3)	2.8 (2.2)
Sample size	677	1,213	2,067	3,066	3,156

Notes: The suspension results are marginal effects from logit models in which the outcome variable is an indicator for receiving a suspension during the year. Standard errors appear in parentheses below each impact estimate. The sample size represents the total number of Kauffman students and matched comparison students in each analysis.

*Significantly different from the prior school year's outcomes at the 5 percent level.

**Significantly different from the prior school year's outcomes at the 1 percent level.



VI. THE KAUFFMAN SCHOOL'S EVOLUTION ACROSS ITS FIRST FIVE YEARS

In preparation for opening the Kauffman School, the Kauffman Foundation's school design team reviewed the education research literature, consulted with education experts, and visited highly successful charter schools to “[identify] the variables that go into making a successful school” (Gentile et al. 2012). Since its founding, the Kauffman School has implemented policies and practices that have been shown in the literature on charter school effectiveness to be related to positive impacts on student achievement.³⁸ In this chapter, we describe the hallmarks of the Kauffman School and how they evolved over the school's first five years of operation. In so doing, we provide context for the Kauffman School's consistently large academic impacts on student achievement and how the impacts have changed over time. We also discuss changes in the Kauffman School's approach to discipline and how the changes may be related to the school's impact on student suspensions.

From 2011–12 to 2015–16, the Kauffman School grew from a one-story building with 103 5th-grade students and 8 teachers into a three-building campus with 535 students in grades 5 through 9 and 56 teachers. As the Kauffman School evolved, it never wavered from either its mission to create college graduates or its high academic expectations. In Table VI.1, we summarize important features of the Kauffman School each year as a way to reflect the school's evolution. For example, the table illustrates the growth in the student body, the corresponding growth in administrative and teaching staff, and new leadership opportunities for teachers.

³⁸ See Johnson et al. (2016a) for a review of this literature.

Table VI.1. Evolution of the Kauffman School

	Year 1	Year 2	Year 3	Year 4	Year 5
Size and Structure					
Grade levels	5th	5th-6th	5th-7th	5th-8th	5th-9th
Number of buildings	1 temporary	1 temporary	2 permanent	2 permanent	2 permanent
Number of schools	1 middle school (MS)	1 MS	1 MS	1 lower MS 1 upper MS	1 lower MS 1 upper MS 1 high school
Number of students	103	185	368	535	681
Student retention rates ^a	81 percent	90 percent	86 percent	84 percent	79 percent
Number of teachers	8	14	31	42	56
Teacher retention rates ^a	50 percent	67 percent	77 percent	67 percent	80 percent
Length of school day (Monday-Thursday) ^b	8 hours, 47 minutes	7 hours, 47 minutes	7 hours, 47 minutes	7 hours, 47 minutes	7 hours, 47 minutes
Length of ELA instruction per day	180 minutes	150 minutes	150 minutes	150 minutes	150 minutes
Length of mathematics instruction per day	104 minutes	100 minutes	100 minutes	100 minutes	100 minutes
Length of science instruction per day	52 minutes	50 minutes	50 minutes	50 minutes	50 minutes
Other subjects taught	Fitness	Fitness	Fitness	Fitness	Fitness, Spanish
Additional periods of instruction	PREP class ^c FOCUS, enrichment clubs	PREP class, FOCUS, enrichment clubs	PREP class, FOCUS, enrichment clubs	PREP class, FOCUS, enrichment clubs	PREP class, FOCUS, enrichment clubs
Key Academic Team Roles					
Executive director		Chief executive officer (CEO)	CEO	CEO	CEO
Principal		Principal	Principal	2 principals	3 principals
		Instructional coaches	Instructional coaches	Instructional coaches	Instructional coaches
Director of special education (DSE)		DSE	DSE	DSE	DSE
Dean of students (DOS)		DOS	DOS	DOS	DOS
		Learning support specialist (LSS)	LSS	LSS	LSS
		Talent recruiter (TR)	TR	TR	TR
			Chief academic officer (CAO) ^d		Instructional leadership team (ILT)
Key Operations Team Roles					
Director of operations (DOO)		DOO	DOO	DOO	DOO

Table VI.1 (continued)

	Year 1	Year 2	Year 3	Year 4	Year 5
	Data and assessment coordinator (DAC)	DAC	DAC	DAC	DAC
			Operations coordinator (OC)	OC	OC
			Office coordinator	Office coordinators	Office coordinators
			Nurse	Nurse	Nurse
				Senior operations specialist	Senior operations specialist
				Social worker	2 Social workers
				Special projects manager	Special projects manager
					Operations manager
					Director of technology and data
Teacher Professional Development					
Key roles for teachers outside the classroom			Grade team chairs	Grade team chairs	Grade team chairs
				Curriculum development teams	Curriculum development teams
Frequency of professional development (PD) sessions	Weekly (4 hours)	Weekly (4 hours)	Weekly (4 hours)	Weekly (4 hours)	Weekly (4 hours)
Estimated number of times teachers report being observed by a supervisor in a typical month	About 2 times	About 4-5 times	About 3-4 times	About 3-4 times	About 4-5 times
Estimated number of times teachers report being observed by a peer in a typical month	n.a ^e	About 4-5 times	About 4 times	About 3-4 times	About 4-5 times
School Culture, Academic Rigor, and Student Discipline					
Strategies to establish strong school culture	3 weeks of staff summer professional development sessions	3 weeks of staff summer professional development sessions	3 weeks of staff summer professional development sessions	4 weeks of staff summer professional development (PD) with 2 weeks focused on culture and early-year PD focused on culture	4 weeks of staff summer professional development with 2 weeks focused on culture and early-year PD focused on culture
Strategies to increase academic rigor	Kauffman School developed its own curriculum	Kauffman School developed its own curriculum	Early adoption of Common Core State Standard (CCSS)-aligned curricula	Added goal-directed behavioral	Added an ILT and aggressive monitoring of students' in-class learning

Table VI.1 (continued)

	Year 1	Year 2	Year 3	Year 4	Year 5
Strategies to address concerns with student discipline	Students serve detention during enrichment period instead of after school	Field trips and parties added as positive incentives	Teachers trained to track students' behavior in class; addition of weekly reports on students' behavior	approach to teacher PD Behavior Intervention Support Team (BIST) system implemented in 5th and 6th grades, and a second dean of students was added	Teacher PD on building strong relationships; teacher and student PD on collaborative problem-solving; teachers reinforcing positive behavior; three deans of students to support consistent implementation of student behavior policy; lightning-quick demerits; rapid re-set after demerits; 5th-grade mindfulness pilot; clear behavioral expectations set with parents and students
Average satisfaction rates^f					
Students	54 percent	75 percent	71 percent	69 percent	69 percent
Teachers	100 percent	88 percent	98 percent	70 percent	90 percent
Parents	95 percent	96 percent	97 percent	n.a. ^g	94 percent

^a The retention rates are calculated as the percentage students or teachers who were present in the fall of one year and remained with the school until the fall of the next year.

^b The Kauffman School has early dismissal on Fridays to allow teachers time to participate in the school's weekly professional development program. The length of the school day includes all of the instructional periods, breakfast, homeroom, transition time between classes, lunch, PREP, FOCUS, and enrichment clubs.

^c PREP classes are classes specially designed to reinforce the school values of Persistence, Results, Empathy, and Passion and life skills. Students attend PREP classes each day (Gentile et al. 2012).

^d The Kauffman School's founding principal started year 3 as the CAO, but this role ended when she transitioned to CEO in March 2014.^e We did not ask teachers to report frequency of classroom observations by peers in Year 1.

^e We did not ask teachers to report frequency of classroom observations by peers in Year 1.

^f There is a slight difference in the wording of the satisfaction question across years. In Year 1, we asked students, teachers, and parents for their overall rating of the Kauffman School. The averages presented for Year 1 represent the proportion of students, teachers, and parents who rated the Kauffman School as good or excellent. In Years 2 through 5, we asked respondents to rate their degree of satisfaction with the Kauffman School. The averages presented in Years 2 through 5 display the proportion of respondents who were satisfied or very satisfied with the Kauffman School.

^g In Year 4, the response rate for the parent survey was too small to report.

n.a. = not applicable.

School culture. The Kauffman School places significant emphasis on establishing a strong school culture at the start of each year and maintaining it throughout the school year. Early planning documents from the Kauffman Foundation stressed the importance of culture in teaching and learning, stating “. . . the best curriculum on earth won’t make any difference in a school in which students are not engaged, teachers don’t have high expectations, and the school spends its time on distractions rather than learning” (Richardson 2009). For the Kauffman School, culture is defined by high academic and behavioral expectations and the use of common routines and procedures across classrooms.

As part of its effort to build a strong school culture each year, the Kauffman School holds a multi-week summer professional development (PD) session for all new and returning staff. The summer PD session runs from 8:00 a.m. to 5:00 p.m. each day. During the first three years, the summer PD session ran for three weeks and addressed curriculum development and school culture. In response to the challenges of establishing a strong culture as the school’s size increased, the Year 4 summer PD was increased to four weeks in order to dedicate more time to culture setting and consistent implementation across teachers. The increased time devoted to school culture in the summer PD sessions extended into the early part of the school year, with PD sessions focused on routines and procedures.

In interviews with school administrators and focus groups with teachers, staff reported that Year 4’s culture was stronger at the start of the school year than in previous years because of the increased emphasis on school culture during both the summer PD session and the early part of the academic year. The Kauffman School CEO also believed that establishing a strong culture in Year 4 increased students’ readiness to learn (Gentile et al. 2015). The stronger school culture that teachers and administrators described in Year 4 could have contributed to the increase in Kauffman School’s achievement impacts by fostering an environment in which classroom distractions were minimized and more time devoted to teaching and learning.

Recognizing the success of Year 4’s summer PD efforts, the Kauffman School followed a similar approach to establishing its school culture in Year 5 by devoting summer and early-year PD to expectations, routines, and procedures. Teachers in Year 5 were as appreciative of the enhanced training in these areas as they were in Year 4. The teachers of grades 5 through 8 remarked that effectively implementing the Kauffman School’s routines and procedures bolstered their classroom management skills, which in turn led to more effective teaching (Gentile et al. 2016).³⁹

Increasing academic rigor. During each of its five years, the Kauffman School placed strong emphasis on the rigor of its curriculum. During the first two years, the Kauffman School’s teachers wrote all of the school’s curriculum out of a desire to be responsive to students’ academic abilities while meeting the school’s high academic expectations. In Year 3, the Kauffman School transitioned to more rigorous educational standards and curricula when it implemented the Common Core State Standard (CCSS) curriculum in advance of Missouri’s planned adoption of CCSS in 2014 (Gentile et al. 2013). Specifically, in Year 3, the Kauffman

³⁹ All staff agreed that 9th-grade students struggled with culture at the start of the year but showed significant improvement by the end of the year (Gentile et al. 2016).

School implemented CCSS-aligned curricula in mathematics and ELA and aligned its science curriculum with CCSS standards since a CCSS-aligned science curriculum was not available. Missouri ultimately chose not to implement CCSS and instead developed new Missouri State Learning Standards. Recognizing that the Kauffman School's CCSS-aligned curricula and assessments met the desired level of rigor, the school decided to keep them in place for Years 4 and 5 as the state finalized new learning standards.

In Year 4, the Kauffman School created two types of teams focused on instruction and curriculum. The instructional leadership team (ILT) consisted of school principals and instructional coaches.⁴⁰ The ILT met a few times per week to discuss best practices related to instruction, culture, and school leadership (Gentile et al., 2015). In addition, curriculum development teams were established in each grade and subject to augment implementation of its CCSS-aligned math and ELA curricula as well as the curricula the Kauffman School developed for other subjects. The curriculum development teams, which were comprised of teachers, were responsible for creating lesson plans and making adaptations to curriculum where necessary based on a regular review of student performance data. These ILT and curriculum development teams continued into Year 5.

A common theme across the five years of school operation, was that teachers found curriculum development to be a challenge. Each year, teachers reported that they were overwhelmed with lesson planning as they worked to adjust the curriculum and lessons to meet students' needs. Nevertheless, most administrators and teachers reported that the newly structured curriculum development teams increased teachers' engagement with the curriculum and fostered collaboration across teachers. In focus groups, teachers cited the team approach to curriculum development as one factor that contributed to their improved teaching (Gentile et al. 2015).

In Year 4, in addition to an existing organizational structure that provided for instructional coaches and grade team chairs⁴¹ to support teachers' professional development, the Kauffman School adopted a goal-directed behavioral approach to teacher professional development in order to increase academic rigor. Instructional coaches guided teacher professional development activities by setting short- and long-term goals related to increasing curricular and instructional rigor. As part of the goal-directed approach, instructional coaches outlined the individual skills that contributed to each goal; teachers, in turn, had to master those skills. In focus groups, instructional coaches reported that the goal-directed approach to professional development allowed them to develop more effective PD sessions by requiring them to create highly detailed, customized PD plans for each teacher (Gentile et al. 2015).

⁴⁰ Deans of students and operations team staff also attended ILT meetings, when necessary.

⁴¹ The Kauffman School created the grade team chair role in Year 2 so that selected teachers could assume some of the workload associated with implementing the school's professional development program and serve as the "instructional and cultural leaders" for their respective grade (Gentile et al. 2013). Grade team chairs are expected to (1) meet regularly with instructional coaches to review the progress of their assigned teachers; (2) identify and facilitate professional development activities to meet the needs of the teachers in their grade by using, for example, assessment or behavioral data; (3) observe teachers; (4) build relationships with teachers in their respective grade; and (5) plan and execute school events such as field trips, observe teachers, and serve as a role model for others.

In Year 5, the ILT conducted frequent reviews of curriculum materials (for example, instructional materials and assessments), conducted video-recorded and in-person classroom observations, and identified benchmarks for enhancing rigor (Gentile et al. 2016). In focus groups and interviews, instructional coaches and other administrators reported an increase in academic rigor as a result of the ILT's efforts, noting that, by year's end, a majority of the teachers were teaching at the desired level of rigor (Gentile et al. 2016).

In Year 5, the Kauffman School also trained teachers to aggressively monitor students' learning during class. Aggressive monitoring is an approach to data-driven decision making that requires teachers to check students' understanding and learning progress frequently throughout the class, provide immediate feedback, and use this information to tailor instruction to meet students' needs (Gentile et al. 2016). In focus groups and interviews, teachers and administrators agreed that aggressive monitoring was an effective teaching practice. Teachers remarked that aggressive monitoring allowed them to teach students more effectively at each student's level. In addition, they have seen an increase in the students' mastery on formative and mid-unit assessments (Gentile et al. 2016).

Extended school day and year. Beginning in Year 1, the Kauffman School's design team implemented a longer school day and year as compared to other schools in KCPS, with the aim of providing more instructional time to enable students to make rapid progress and overcome deficits in key skill areas, especially ELA and mathematics. In response to concerns raised by parents in Year 1 about the length of the school day (for example, children arriving home too late in the evening; Gentile et al. 2012), the Kauffman School shortened the school day by one hour in Years 2 through 5 (Table VI.1). Even after the decrease in the length of the school day in Years 2 through 5, Kauffman students still received approximately five additional weeks of instruction per year compared to other students in KCPS district schools. The extra time translates into about one additional year of instruction for students who enter the Kauffman School in 5th grade and remain through 12th grade. Both the longer school day and the Kauffman School's high average daily attendance rate (greater than 95 percent) mean that students receive additional instructional time that may be related to the strong academic growth observed each year.

Increased mathematics and reading time. The school design team determined that Kauffman students would need more instructional time specifically in mathematics and reading in order to catch up academically (Gentile et al. 2012). To this end, the Kauffman School provided its students with a double period of mathematics and three periods of ELA instruction every year during its first five years (Table VI.1). In Year 2, the Kauffman School added a guided reading course to its ELA program because many of the incoming 5th-graders were reading well-below grade level and needed instruction in reading skills. The school replaced the period allocated to nonfiction reading with a period devoted to guided reading so that teachers could work with students in small groups to help develop their basic reading skills. After guided reading was added in Year 2, the Kauffman School continued to provide the course every year to students in each grade.

Extensive teacher professional development. From the outset, the Kauffman School has placed significant emphasis on teachers' professional development. Starting in Year 1, the Kauffman School's teacher professional development program included weekly small- and large-

group professional development sessions (Table VI.1), weekly meetings with instructional coaches, and frequent classroom observations by various Kauffman School staff, including administrators and peers. To underscore the importance of classroom observations to teachers' development, the Kauffman School's new campus that opened in Year 3 was designed to promote classroom observations by building each classroom with a large interior window that allows anyone in the hallway to see what is happening in any classroom (Gentile et al. 2014).

During each of the Kauffman School's first five years, incoming and returning teachers frequently cited the Kauffman School's professional development program as one of the main factors that attracted them to the school. One teacher noted, "For me, it was the opportunity to grow as a teacher . . . getting the feedback to become better, that's what really attracted me to come here" (Gentile et al. 2016). In general, teachers were satisfied with the professional development they received and frequently commented on their professional growth. In the words of one teacher, "Last year I improved more as a teacher than I could have imagined I would" (Johnson et al. 2016a).

Increasing school staff. The school's staff grew from Year 1 to Year 5 as the Kauffman School expanded (Table VI.1). In Year 1, the Kauffman School's academic team was comprised of the principal, a director of special education, a dean of students, and teachers. The Kauffman School did not have instructional coaches so the principal coached all teachers and led the professional development program (Gentile et al. 2012). In addition to the academic team, school leadership included the operations team (Table VI.1), which was responsible for the day-to-day operation of the school (for example, transportation and reporting). The Kauffman School implemented its two-team administrative model as a way to allow the academic team to focus on creating the best academic program possible as the operations team addressed administrative tasks (Gentile et al. 2012). Over the five years, both teams met together routinely so that the operations staff could support the academic team.

As illustrated in Table VI.1, the academic and operations teams expanded each year to accommodate increases in the number of students and teachers (for example, more instructional coaches were hired each year, a full-time social worker was hired in Year 4). In Year 4, the Kauffman School grouped its students into a lower middle school (grades 5 and 6) and an upper middle school (grades 7 and 8) and, in Year 5, added a high school (grade 9). Each school has its own principal, dean of students, and its own set of teachers (Gentile et al. 2016).

School discipline. In order to support the school's culture and academic program, the Kauffman School established clear norms and expectations for student behavior. In planning documents, the Kauffman School design team identified a clearly defined, consistently implemented discipline system as vital for meeting the school's mission to create college graduates; the system is grounded in the belief that misbehavior has the potential to inhibit teaching and learning. As part of the effort to encourage students' adherence to the Kauffman School's behavioral expectations (for example, students are expected to cooperate fully with the Kauffman School's uniform policy), the Kauffman School prioritizes consistent implementation of its school norms and expectations for student behavior across teachers, classrooms, and school activities to ensure that students are always held to the same expectations. In addition, the Kauffman School actively communicates its school norms and expectations to students and parents before families even enroll in the school, during the enrollment process, at the start of the

school year in parent and student orientation meetings, and throughout the school year (Gentile et al. 2012). We discuss the implementation of the Kauffman School's norms and expectations for student behavior below.

In Year 1, Kauffman School administrators reported that strict implementation the school's norms and expectations posed a challenge for students, parents, and staff, noting that some students were frequently serving detention (Gentile et al. 2012). In an attempt to remedy the problem, the Kauffman School experimented with a new approach that required students to serve detention during their enrichment club period in hopes that missing out on an enjoyable activity at school would encourage their compliance with the school's expectations.⁴² In Years 2 and 3, the Kauffman School added incentives—field trips, overnight trips, and parties—to encourage students' further compliance with behavioral expectations (Gentile et al. 2013; Gentile et al. 2014). In Year 3, the Kauffman School introduced a new approach to tracking students' behavior. Teachers were trained to use computer tablets to record students' in-the-moment compliance with behavioral expectations and issue merits and demerits (Gentile et al. 2014). The teachers used the data they collected on student compliance to generate weekly reports, called PREP reports, and included a PREP score for each student based on the number of merits and demerits a student earned. The school required the students to present their PREP report to their parents; parents then had to sign the PREP report, and students had to return the signed report to school (Gentile et al. 2014). Students' PREP scores were linked to incentives such as field trips (for example, only students with a PREP score of 85 or higher were allowed to go on field trips; Gentile et al. 2014). Despite the Kauffman School's efforts to encourage students' compliance with its rules in Years 1 through 3, students were more likely to be suspended than students attending other schools in Kansas City during the first three years of school operation.

In Year 4, the Kauffman School continued to monitor students' behavior data and implement strategies to foster students' compliance with behavioral expectations. As in earlier years, Kauffman students continued to serve detention during the enrichment class period and earn incentives linked to the in-class tracking and PREP score approach introduced in Year 3. In Year 4, the Kauffman School added the Behavioral Intervention Support Team (BIST) program for the 5th and 6th grades; the program was intended to limit the amount of time students spend outside of the classroom because of behavioral issues (Gentile et al. 2015).⁴³ In interviews, Kauffman School administrators reported that the BIST system was not implemented effectively in Year 4, so it was not going to be used in Year 5. The Kauffman School also added a second dean of students to the school staff, and the lower and upper middle schools had their own dean. This arrangement allowed the deans to better manage their workloads and focus on the unique challenges in their school (Gentile et al. 2015).

In Year 5, the Kauffman School maintained many of the elements of its discipline system that it had established in earlier years, including PREP reports and incentives. The school did

⁴² The enrichment club period was implemented after the start of Year 1 as a way to help teachers and students build relationships by engaging in activities of mutual interest (for example, card games; Gentile et al. 2012). Enrichment clubs are offered at the end of the school day.

⁴³ School administrators implemented the BIST system only in the 5th and 6th grades because they wanted to test the impact of the system to determine whether they should implement it schoolwide.

make a change with respect to detention in Year 5, requiring students to serve detention during either lunch or in their PREP class instead of during the enrichment club period (Kauffman School 2015). Nonetheless, Kauffman School staff continued to voice concerns about students' behavior in Year 5 and therefore changed their approach to issuing demerits. The Kauffman School added a public "lightning-quick" approach to issuing demerits. The aim of the lightning-quick approach was to create an immediate change in students' behavior because the demerits were issued immediately and aloud rather than later and in private (Gentile et al. 2015). The Kauffman School implemented the lightning-quick approach to demerits after learning that other high-performing schools had success with the method (Gentile et al. 2015). In interviews and focus groups with school administrators and teachers, school staff reported that the lightning-quick approach was having a positive impact on students' behavior (Gentile et al. 2016).

Suspensions decreased significantly in Year 4. Although school administrators did not perceive that the BIST system introduced in Year 4 was reducing student misbehavior (and therefore decided against continuing the program in Year 5), the BIST system may have contributed to the Year 4 decline in the suspension rate for 5th and 6th graders. The addition of a second dean, which allowed the deans to better manage their workloads and focus on their school's needs, may have also contributed to the decline in suspensions.

Between Years 4 and 5, the suspension rate continued to decline significantly. According to school administrators, possible reasons include: (1) the addition of workshops on building strong relationships during teachers' summer professional development sessions; (2) training for students and teachers on collaborative problem-solving strategies; (3) a renewed emphasis on aspirational narration – teachers reinforcing students' positive behavior; (4) an increase to three deans of students to support consistent implementation of the student behavior policy, such as the lightning-quick demerit system; (5) rapid re-sets after students receive demerits, so that little instructional time is lost; (6) a pilot with 5th-grade teachers and students on mindfulness strategies; and (7) the establishment of very clear behavioral expectations with parents and students (before the school year and at back-to-school night), so that everyone understands the rules and consequences, and the reasons why it is important for students to comply with the school's behavioral expectations (to ensure little instructional time is lost and all students can focus on learning).



VII. CONCLUSIONS

The Kauffman School has ambitious goals for its students: accelerated learning and high levels of attendance. The results from our analysis of assessment and attendance data show that the Kauffman School is achieving these goals.

Academic goals. An analysis of data from the Kauffman School’s first five years shows that the school achieved its goal of average student growth of at least 1.25 years for every year of attendance. Upon entering the school, the average student was substantially below the state average in terms of mathematics and ELA scores but, within three years, performed above the state average in both subjects. Though the Kauffman School did not achieve its ambitious goal of 75 percent proficiency on each state assessment after three years of enrollment, the school achieved that goal after four years of student enrollment. After five years of enrollment, more than 90 percent of students scored proficient or advanced on the Algebra I and biology EOC exams.

Comparisons to other charter schools. The Kauffman School’s impact on student test scores is significantly greater than the impact of other charter schools in Kansas City. The Kauffman School’s three-year impacts are also greater than the average effects of groups of other charter schools known for strong performance, such as those in Boston and New York City, as well as the KIPP network of charter schools.

Attendance goals. The Kauffman School achieved its goal of an average daily attendance rate of 95 percent during each of its first five years (Johnson and Demers 2016). During every year since 2012–13, the Kauffman School has had a consistent positive impact on its students’ rate of attendance, boosting it by a little less than 1 percentage point as compared to similar peers.

Suspension of students. During both 2014–15 and 2015–16, the Kauffman School’s impact on student suspensions declined significantly relative to the previous year. In 2015–16, Kauffman students were no more likely to receive suspensions than were similar students in Kansas City.

Summary. The hallmarks of the Kauffman School reflect educational practices that, according to the research literature, are effective in promoting student achievement (Johnson et al. 2016a). Although we cannot determine conclusively which practices made the greatest contribution to the Kauffman School’s positive impacts on student achievement, it is likely that the combined effect of these features contributed to the academic impacts over the school’s first five years of operation. The adjustments made in Year 4 to culture and academic rigor may help explain the significant increase in achievement gains from Year 3 to Year 4. The changes implemented in Year 5 may also have helped the Kauffman School maintain the high level of academic impacts during that year. Similarly, the combination of strategies for addressing behavioral noncompliance, including the addition of a second dean and the implementation of new discipline policies, may have contributed to the significant decrease in suspensions in Years 4 and 5.

REFERENCES

- Abdulkadiroglu, A., J. Angrist, S. Cohodes, S. Dynarski, J. Fullerton, T. Kane, and P. Pathak. "Informing the Debate: Comparing Boston's Charter, Pilot and Traditional Schools." Boston, MA: Boston Foundation, January 2009.
- Bloom, H.S., C.J. Hill, A.R. Black, and M.W. Lipsey. "Performance Trajectories and Performance Gaps as Achievement Effect-Size Benchmarks for Educational Interventions." *Journal of Research on Educational Effectiveness*, vol. 1, no. 4, 2008, pp. 289–328.
- Center for Research on Education Outcomes (CREDO). "Urban Charter School Study Report on 41 Regions." Stanford, CA: CREDO, 2015. Available at <http://urbancharters.stanford.edu/download/Urban%20Charter%20School%20Study%20Report%20on%2041%20Regions.pdf>. Accessed February 8, 2016.
- Clark, M.A., H.S. Chiang, T. Silva, S. McConnell, K. Sonnenfeld, A. Erbe, and M. Puma. "The Effectiveness of Secondary Math Teachers from Teach For America and the Teaching Fellows Programs." (NCEE 2013-4015). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education, September 2013.
- Ewing Marion Kauffman Foundation. "Charter School Application: Ewing Marion Kauffman School." Kansas City, MO, 2010. Available at <https://dese.mo.gov/sites/default/files/qs-charter-EwingMarionKauffman.pdf>. Accessed April 12, 2017.
- Ewing Marion Kauffman School. "About Us." Kansas City, MO: Ewing Marion Kauffman Foundation, 2017. Available at <http://www.kauffmanschool.org/>. Accessed January 13, 2017.
- Furgeson, J., B. Gill, J. Haimson, A. Killewald, M. McCullough, I. Nichols-Barrer, B. Teh, N. Verbitsky-Savitz, M. Bowen, A. Demeritt, P. Hill, and R. Lake. "Charter-School Management Organizations: Diverse Strategies and Diverse Student Impacts." Princeton, NJ: Mathematica Policy Research, January 2012.
- Gentile, Claudia, Cleo Johnson, Scott Richman, Ava Madoff, Veronica Severn, and Forest Crigler. "The Kauffman School Evaluation End-of-Year Report: Results from Surveys, Observations and Qualitative Data Year 5." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, September 2016.
- Gentile, Claudia, Cleo Johnson, Scott Richman, Matthew Johnson, Ava Madoff, Alicia Haelen, Forest Crigler, Veronica Severn, and Kaylee Pettoruto. "The Kauffman School Evaluation End-of-Year Report Year 4." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, August 2015.

- Gentile, Claudia, Cleo Johnson, Scott Richman, Matthew Johnson, Alicia Leonard, Eric Lundquist, Ava Madoff, and Katherine Mosher. "The Kauffman School Evaluation End-of-Year Report Year 3." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, August 2014.
- Gentile, Claudia, Cleo Johnson, Scott Richman, Eric Lundquist, Matthew Johnson, Alicia Leonard, Ava Madoff, and Katherine Mosher. "The Kauffman School Evaluation Year Two: End-of-Year Report." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, August 2013.
- Gentile, Claudia, Lisbeth Goble, Cleo Johnson, Matthew Johnson, Eric Lundquist, Thomas Armington, Alicia Leonard, Ava Madoff, and Katherine Mosher. "The Kauffman School Evaluation Year One: End-of-Year Report." Princeton, NJ: Mathematica Policy Research, August 2012.
- Gill, B., J. Furgeson, H. Chiang, B. Teh, J. Haimson, and N. Verbitsky Savitz. "Replicating Experimental Impact Estimates with Nonexperimental Methods in the Context of Control-Group Noncompliance." *Statistics and Public Policy*, vol. 3, issue 1, 2015.
- Gleason, P., M. Clark, C.C. Tuttle, and E. Dwoyer. "The Evaluation of Charter School Impacts: Final Report." NCEE 2010-4029. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education, June 2010.
- Hoxby, C., S. Murarka, and J. Kang. "How New York City's Charter Schools Affect Achievement, August 2009 Report." Second report in the series. Cambridge, MA: New York City Charter Schools Evaluation Project, September 2009.
- Johnson, Matthew, and Alicia Demers. "The Kauffman School Evaluation End-of-Year Report: Short-Term and Medium-Term Student Outcomes Year 5." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, September 2016.
- Johnson, Matthew, Alicia Demers, Cleo Jacobs Johnson, Scott Richman, Claudia Gentile, and Eric Lundquist. "The Educational and Behavioral Impacts of the Ewing Marion Kauffman Charter School." Working Paper 43. Oakland, CA: Mathematica Policy Research, March 2016a. Available at <https://www.mathematica-mpr.com/our-publications-and-findings/publications/the-educational-and-behavioral-impacts-of-the-ewing-marion-kauffman-charter-school>. Accessed April 1, 2016.
- Johnson, Matthew, Alicia Demers, Cleo Jacobs Johnson, and Claudia Gentile. "Ewing Marion Kauffman School Evaluation Impact Report Year 4." Report submitted to the Ewing Marion Kauffman Foundation. Princeton, NJ: Mathematica Policy Research, June 2016b. Available at <https://www.mathematica-mpr.com/our-publications-and-findings/publications/ewing-marion-kauffman-school-evaluation-impact-report-year-4>. Accessed December 29, 2016.
- Kauffman School. "Student & Family Handbook 2015-2016." Kansas City, MO: Ewing Marion Kauffman School, 2015.

North, Aaron. “Kauffman Scholars Charter School Project: Community Study.” Kansas City, MO: Northology LLC, April 24, 2009.

Richardson, Munro. “School Design.” Memorandum to the Kauffman Board of Trustees, Kauffman Foundation, November 23, 2009.

Rubin, D.B. *Multiple Imputation for Nonresponse in Surveys*. New York: Wiley, 1987.

Tuttle, C., B. Gill, P. Gleason, V. Knechtel, I. Nichols-Barrer, and A. Resch. “KIPP Middle Schools: Impacts on Achievement and Other Outcomes.” A Report of the National Evaluation of KIPP Middle Schools. Washington, DC: Mathematica Policy Research, 2013.

Tuttle, C., P. Gleason, V. Knechtel, I. Nichols-Barrer, K. Booker, G. Chojnacki, T. Coen, and L. Goble. “Understanding the Effect of KIPP as It Scales: Volume I, Impacts on Achievement and Other Outcomes.” Final Report of KIPP’s Investing in Innovation Grant Evaluation. Washington, DC: Mathematica Policy Research, 2015.

This page has been left blank for double-sided copying.

APPENDIX

DATA, SAMPLE SELECTION, AND ANALYSIS METHODOLOGY

This page has been left blank for double-sided copying.

A. Data preparation details

The Missouri Department of Elementary and Secondary Education provided data on the results from its state assessment and on student characteristics for all students enrolled in Missouri public schools from 2007–08 through 2015–16. The state assessment data includes the Missouri Assessment Program (MAP) and end-of-course (EOC) scaled scores, proficiency levels, and information on test accommodations for each student by year, grade level, and content area. The data on student characteristics includes information on demographic characteristics, free or reduced-price lunch status, limited English proficiency, disability, attendance, and disciplinary information for each student by year and school in which they were enrolled. Also included are school-level characteristics such as charter school classification and location.

To link the state assessment and student characteristics data, we reduced both to the student level. From the assessment data, we removed records in which students had more than one unique subject-specific MAP or EOC scaled score reported in a given year. There are three administration windows for EOC exams in each year: fall, spring, and summer. A large majority of students take EOC exams in the spring, so we used the spring score if available. If a student had no spring score, we used that student’s fall score. If neither spring nor fall scores were available, we used the score from the summer administration.⁴⁴

From the characteristics data, we first removed all records with zero or missing reported attendance and then summed attendance and disciplinary variables across each student’s school-specific records to calculate student-year totals. We then reduced the data to the student level such that all year-specific attendance and/or disciplinary information was preserved in separate variables. Demographic information, free or reduced-price lunch status, limited English proficiency, and disability information were taken from the student’s 4th-grade record if available, from the 3rd-grade record if the 4th-grade record was not available, and from the 5th-grade record if both 4th- and 3rd-grade records were not available. Students not found in both the assessment and the characteristics data were dropped from the analysis.

We created several new variables to facilitate the analyses. We transformed student MAP and EOC scaled scores into z -scores based on statewide year-, grade-, and subject-specific means and standard deviations. We also used information on enrollment and absences to create a measure of the attendance rate that we bottom-coded at the year-specific first percentile to remove extreme outliers. We used disciplinary information to create yearly indicators of whether students were suspended that year.⁴⁵ We then collapsed subject-specific 3rd- and 4th-grade MAP z -scores into grade-specific variables by taking each student’s most recent score (by year) within the grade level for students who repeated a grade. We created a single binary test

⁴⁴ Students in the Kauffman School took the Algebra I and biology EOC exams in the spring. In the Kansas City comparison group, 84 percent took Algebra I in the spring, 12 percent took it in the fall, and 4 percent took it in the summer. The distribution was similar for biology: 84 percent took the EOC exam in the spring, 13 percent took it in the fall, and 3 percent took it in the summer. These percentages are based on the number of students entering the matched comparison group analyses.

⁴⁵ We used 4th-grade attendance and suspensions as control variables in all analyses. If 4th-grade information on these variables was missing, then 3rd-grade values were used instead.

accommodation indicator to represent having test accommodations on any 3rd- or 4th-grade MAP test.

When a student repeats a grade, it creates a missing-data problem for the analysis because that student no longer takes the same outcome assessment as the rest of the students in his or her original cohort. We follow the method used in Tuttle et al. (2013) for dealing with missing outcome scores for repeaters, which involves assuming that the relative rank in the district test score distribution does not change after the first time the repeater completed his or her previous grade. This is done for both Kauffman students and comparison students who repeated a grade. For example, students who repeat 5th grade are included along with other students from their same cohort in the two-, three-, and four-year impact estimates, with the z -scores of the repeater students fixed at their end-of-5th-grade values. Cohort I and II students who repeated any grade were missing 8th-grade science scores, so we used their 5th-grade science z -scores for our main analysis.

Because we have shown that the Kauffman School has positive impacts on student achievement, the assumption about the test scores of repeaters will likely understate the two-, three-, and four-year impact estimates, because we are assuming that the Kauffman School has no effect on repeaters during their subsequent years enrolled. Johnson et al. (2016b) show that the exclusion of grade repeaters leads to small increases in the Kauffman School impact estimates. Note that student grade repetition does not pose a problem for the EOC analyses, because those exams are given to students in multiple grades. The analysis therefore does not depend on students taking the exam at the same time as other students in their cohort. For example, Cohort I Kauffman students who repeated a grade at some point are not included in the 2015–16 EOC analysis, because they were 8th-graders in that year and did not take the EOC exams that 9th-grade Kauffman students did. If these students progress into 9th grade in 2016–17 and take the EOC exams then, they will be included in the 2016–17 analysis.

B. Sample selection

The Kauffman School group is composed of students who were enrolled in the Kauffman School in 5th grade in any year from 2011–12 through 2015–16 for at least part of the school year.⁴⁶ The *Kansas City district schools* comparison group is composed of students enrolled in the Kansas City Public Schools district in 5th grade in our analysis years during at least part of the school year who were not included in the Kauffman School group. The *Kansas City charter schools* comparison group includes only those students who were enrolled in 5th grade for all or part of the school year in a Kansas City charter school. The *all Kansas City public schools* comparison group includes all students in either of the two comparison groups.

⁴⁶ In 2014–15, the Kauffman School began backfilling enrollment by accepting new students in grades 6 and higher who were not previously enrolled in the school in 5th grade. These students were excluded from our analysis because the amount of time they spent at the Kauffman School is not comparable to other students in the same grade. Some 5th-grade students were also enrolled in the school mid-year. These students were included in the analysis because they spent part of their 5th-grade year at the Kauffman School.

In addition to these restrictions, we excluded any Kauffman students who were missing all outcome test scores or all 3rd- and 4th-grade MAP test scores.⁴⁷ We also dropped any comparison students who were missing all 3rd- and 4th-grade MAP test scores or any outcome scores from the final analysis sample. Finally, we excluded from the comparison group any students who were enrolled for part of any school year at the Kauffman School (and included them in the Kauffman School group). Tables 1–5 show the number of students included in the Kauffman School and comparison groups for each grade and cohort in our analysis.

The baseline average characteristics of all students in the Kauffman School and comparison groups for Cohort I students are shown in Table 1; for Cohort II students, in Table 2, for Cohort III students, in Table 3; for Cohort IV students, in Table 4; and for Cohort V students, in Table 5. These tables show that the Kauffman students in our sample tend to differ significantly from students enrolled in Kansas City public schools on several key baseline measures.⁴⁸ Kauffman students had significantly higher average 4th-grade MAP test scores than did students in other Kansas City schools, though all groups had test scores below the statewide average.⁴⁹ Kauffman students are also more likely to be black and less likely to be Hispanic, were less likely to receive baseline test accommodations, and had higher 4th-grade attendance rates than students enrolled in Kansas City district schools. The same directional trends exist for Kauffman students relative to other Kansas City charter school students, but the differences are less pronounced and less likely to be statistically significant.

⁴⁷ Students who transfer to different school districts in Missouri will generally remain in our sample, but students who leave the state will be excluded because their test scores will be missing.

⁴⁸ Characteristics for which there are a small percentage of Kauffman students in our sample (e.g., English language learner or disability status) may not be representative of the Kauffman School overall because of DESE's data redacting policy. This is especially true for Cohort I and Cohort II, which were half the size of subsequent cohorts and more likely to be affected by the data redaction.

⁴⁹ From 2010–11 through 2013–14, the statewide average 4th-grade MAP scaled score was 648 in mathematics and 661 in ELA. The statewide standard deviation of 4th-grade MAP scores was 34 in mathematics and 38 in ELA. These scores were calculated by averaging the year-specific means and standard deviations. In 2015–16, new MAP assessments were used. The average 4th-grade MAP scaled score in 2015–16 was 482 in mathematics and 485 in ELA, and the standard deviation was 56 in mathematics and 51 in ELA.

Table A.1. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort I 9th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade MAP mathematics scaled score	635	628	627	630
4th-grade MAP ELA scaled score	651	637**	635**	644
Free or reduced-price lunch	0.94	0.93	0.94	0.92
Black	0.97	0.68**	0.62**	0.83**
Hispanic	0.03	0.23**	0.26**	0.14**
English language learner	0.00	0.17**	0.21**	0.07**
Male	0.47	0.50	0.51	0.46
Disabled	0.02	0.07**	0.09**	0.02
Any baseline test accommodation	0.02	0.20**	0.25**	0.05*
4th-grade attendance rate	0.94	0.93	0.93**	0.94
4th-grade ever suspended	0.20	0.20	0.19	0.20
Sample size	64	1,337	984	406

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

ELA = English language arts.

Table A.2. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort II 8th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade mathematics scaled score	648	632**	630**	637**
4th-grade ELA scaled score	654	640**	636**	647
Free or reduced-price lunch	0.82	0.91	0.94*	0.85
Black	0.91	0.66**	0.58**	0.82*
Hispanic	0.07	0.22**	0.29**	0.10
English language learner	0.04	0.16**	0.21**	0.05
Male	0.49	0.45	0.47	0.40
Disabled	0.00	0.07**	0.08**	0.05**
Any baseline test accommodation	0.04	0.21**	0.29**	0.07
4th-grade attendance rate	0.96	0.95**	0.95**	0.95**
4th-grade ever suspended	0.11	0.21*	0.20*	0.24**
Sample size	57	1,224	807	442

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

ELA = English language arts.

Table A.3. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort III 7th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade mathematics scaled score	632	633	630	640*
4th-grade ELA scaled score	651	640**	635**	652
Free or reduced-price lunch	0.92	0.92	0.95	0.87
Black	0.95	0.60**	0.54**	0.73**
Hispanic	0.04	0.27**	0.31**	0.18**
English language learner	0.00	0.22**	0.28**	0.08**
Male	0.44	0.49	0.52	0.44
Disabled	0.02	0.08**	0.10**	0.03
Any baseline test accommodation	0.03	0.28**	0.36**	0.10**
4th-grade attendance rate	0.95	0.95*	0.94*	0.95
4th-grade ever suspended	0.19	0.15	0.17	0.12
Sample size	132	1,229	849	393

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

ELA = English language arts.

Table A.4. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort IV 6th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade mathematics scaled score	635	627**	625**	632
4th-grade ELA scaled score	651	638**	632**	648
Free or reduced-price lunch	0.97	0.90**	0.94*	0.83**
Black	0.91	0.56**	0.51**	0.68**
Hispanic	0.06	0.29**	0.36**	0.17**
English language learner	0.01	0.24**	0.33**	0.07**
Male	0.44	0.49	0.51	0.44
Disabled	0.06	0.12**	0.16**	0.04
Any baseline test accommodation	0.05	0.33**	0.45**	0.11*
4th-grade attendance rate	0.96	0.95	0.95*	0.95
4th-grade ever suspended	0.19	0.17	0.16	0.20
Sample size	169	1,258	829	447

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

ELA = English language arts.

Table A.5. Baseline 4th-grade average characteristics of Kauffman students and other Kansas City public school students: Cohort V 5th graders

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade mathematics scaled score	2452	2437*	2433**	2444
4th-grade ELA scaled score	2455	2436**	2427**	2453
Free or reduced-price lunch	0.96	0.89**	0.93	0.82**
Black	0.91	0.55**	0.50**	0.67**
Hispanic	0.06	0.29**	0.35**	0.17**
English language learner	0.02	0.17**	0.22**	0.08**
Male	0.50	0.50	0.52	0.45
Disabled	0.06	0.12**	0.17**	0.02
Any baseline test accommodation	0.09	0.33**	0.43**	0.13
4th-grade attendance rate	0.95	0.95	0.94*	0.95
4th-grade ever suspended	0.19	0.15	0.14	0.19
Sample size	163	1,424	963	482

*Significantly different from Kauffman students at the 5 percent level.

**Significantly different from Kauffman students at the 1 percent level.

Note: For cohort V Kauffman and comparison students, free lunch status comes from 3rd grade rather than 4th grade. This is because both the Kauffman School and KCPS participated in the Community Eligibility Provision meal service option in 2014–15 and free or reduced-price lunch status was not tracked that year

ELA = English language arts.

C. Multiple imputation methodology

We calculated impact estimates by using a multiple imputation procedure with $M = 10$ imputed data sets. We imputed missing baseline outcome variable values separately by treatment or comparison status by using a chained linear equations model that included all outcome variables and all student characteristic variables in the final impact regressions. Results that exclude imputed data and limit the sample to students for whom all data were missing are available upon request.

Students were excluded from the imputation model if they had missing data for all 3rd- or 4th-grade MAP test scores or missing data for all outcome MAP or EOC test scores. Missing values were imputed before both propensity-score matching and regression analyses in each multiple imputation data set.

In addition to imputing baseline test scores, we imputed mathematics scores for students who took the 8th-grade Algebra I EOC exam in place of the 8th-grade mathematics MAP exam. In the 8th-grade mathematics imputation, we included 8th-grade ELA and science MAP test scores, 7th-grade ELA and mathematics test MAP scores, 8th-grade attendance and suspension data, and the same set of student baseline characteristic variables included in the other imputations.

After collecting coefficient and standard error estimates from each of the 10 imputed data sets, we computed multiple imputation coefficients and standard errors by using Rubin's combination method (Rubin 1987). The multiple imputation beta (β_M) coefficient is the average of the beta coefficient values in each imputed data set (β_m); the multiple imputation standard error is the square root of the within-imputation coefficient variance (Var_W) plus the between-imputation coefficient variance (Var_B) inflated by a finite imputation correction multiplier:

$$(1) SE_M = \sqrt{Var_W + \left(1 + \frac{1}{M}\right) Var_B} = \sqrt{\left(\frac{\sum_{m=1}^M Var_m}{M}\right) + \left(1 + \frac{1}{M}\right) \left(\frac{\sum_{m=1}^M (\beta_m - \beta_M)^2}{M-1}\right)}$$

D. Propensity-score matching methodology

We estimated a propensity score for each eligible treatment and comparison student in each multiple imputation data set using a stepwise logistic regression model. We used an entry criterion of ($p < .20$) to determine whether each variable would enter the final logistic regression model. (See Table 6 for a list of the variables.)

As a result of the data redacting process, there were some cohorts in which all Kauffman students with a certain characteristic were removed from the data. For example, all Cohort I 9th-grade English language learner Kauffman students were redacted from the data. In such cases, we dropped all comparison students with this characteristic from the data prior to the matching.

Table A.6. Potential covariates used for propensity-score matching

4th-grade mathematics and ELA MAP z-scores
Second- and third-order polynomials of 4th-grade mathematics and ELA MAP z-scores
3rd-grade mathematics and ELA MAP z-scores
4th-grade attendance rate and ever-suspended variables
Gender, race, individualized education program, English language learner, free or reduced-price lunch, any baseline test accommodation
Indicators for imputed 3rd- and 4th-grade mathematics and ELA MAP z-score variables
Indicator for imputed 4th-grade attendance rate or ever-suspended variables

ELA = English language arts.

After generating propensity scores for each Kauffman student and eligible comparison student, we selected a matched comparison group by finding comparison students with propensity scores within a given threshold, or radius, from each Kauffman student's propensity score. Comparison students were sampled with replacement, which means that each comparison student could be matched to multiple Kauffman students. To limit the number of possible comparison students, we specified a minimum matching radius and maximum number of potential matched neighbors.⁵⁰ Because district students differed more from Kauffman students

⁵⁰ For each analysis, the matching radius was 0.0010 for the all Kansas City comparison group; it was 0.0020 for the district comparison group and 0.0016 for the charter comparison group. The maximum number of potential matched neighbors was 20.

on baseline characteristics relative to the other two groups, we made the matching radius larger for the district comparison group to prevent the samples of the Kauffman and matched comparison students from being too small. If there were no comparison students within the matching radius for a given treatment student, that student was excluded from the matched comparison impact analyses. Because each comparison student could be matched to multiple treatment students, we used a weighting scheme in which each treatment student had a weight of one, and each comparison student had a weight representing the number of matching treatment students. Table 7 shows summary matching information for each comparison group.⁵¹

Table A.7. Matching information summary

	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Algebra I EOC analysis			
Number of Kauffman students	43	43	43
Mean number of Kauffman students matched	38	38	35
Mean number of comparison students	306	226	105
Mean matches per Kauffman student	10.9	9.3	3.9
Biology EOC analysis			
Number of Kauffman students	40	40	40
Mean number of Kauffman students matched	34	31	27
Mean number of comparison students	254	193	80
Mean matches per Kauffman student	10.0	9.1	3.3
Cohort I 9th graders (attendance and suspension analysis)			
Number of Kauffman students	64	64	64
Mean number of Kauffman students matched	62	59	55
Mean number of comparison students	535	378	177
Mean matches per Kauffman student	14.2	10.9	4.7
Cohort II 8th graders			
Number of Kauffman students	57	57	57
Mean number of Kauffman students matched	50	47	49
Mean number of comparison students	409	280	180
Mean matches per Kauffman student	10.7	8.3	4.8
Cohort III 7th graders			
Number of Kauffman students	132	132	132
Mean number of Kauffman students matched	115	107	108
Mean number of comparison students	475	323	220
Mean matches per Kauffman student	6.5	4.8	3.9
Cohort IV 6th graders			
Number of Kauffman students	169	169	169

⁵¹ For other grade/cohort combinations, see Johnson et al. (2016b).

Table 7 (continued)

	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Mean number of Kauffman students matched	158	140	139
Mean number of comparison students	533	341	239
Mean matches per Kauffman student	5.2	3.8	2.9
Cohort V 5th graders			
Number of Kauffman students	163	163	163
Mean number of Kauffman students matched	145	143	129
Mean number of comparison students	675	484	249
Mean matches per Kauffman student	7.4	5.8	3.2

Notes: There are fewer Kauffman students in the EOC analysis than in the Cohort I 9th-grade analysis. This is partly because students who started as 5th graders in the Kauffman School but transferred out at some point may have taken the EOC exams in a different grade in their new school. Cohort I Kauffman students who repeated a grade were also excluded from this year's EOC analysis because they had not yet taken the exam, but they will be included in the sample for next year's EOC analysis.

Table 8 presents summary statistics to show how well Kauffman students were matched to comparison students on baseline characteristics. On average, comparison students from each matched group were not significantly different from Kauffman students on any baseline characteristics used in the analysis. Note that the samples in Table 8 are smaller for both Kauffman and comparison students relative to those in tables 1–5. This is because some Kauffman students differed enough from all comparison students such that no good match for these students could be found.⁵²

⁵² The composition of Kauffman students included in each matched comparison group analysis differs slightly from one analysis to the next based on each comparison group. In Table 9, we report averages for Kauffman students included in the main analysis in which the comparison group includes all Kansas City public schools.

Table A.8. Baseline 4th-grade average characteristics of matched comparison samples

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
Cohort I 9th graders				
4th-grade mathematics scaled score	633 (30)	634 (32)	631 (31)	635 (30)
4th-grade ELA scaled score	649 (32)	648 (30)	644 (30)	649 (31)
Free or reduced-price lunch	0.95 (0.21)	0.91 (0.28)	0.92 (0.27)	0.93 (0.26)
Black	0.97 (0.18)	0.98 (0.15)	0.98 (0.14)	0.96 (0.20)
Hispanic	0.03 (0.18)	0.02 (0.15)	0.02 (0.14)	0.04 (0.20)
English language learner	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Male	0.47 (0.50)	0.46 (0.50)	0.45 (0.50)	0.47 (0.50)
Disabled	0.02 (0.13)	0.05 (0.22)	0.02 (0.13)	0.02 (0.11)
Any prior test accommodation	0.02 (0.13)	0.04 (0.20)	0.02 (0.15)	0.01 (0.11)
4th-grade attendance rate	0.94 (0.05)	0.94 (0.05)	0.94 (0.05)	0.95 (0.05)
4th-grade ever suspended	0.21 (0.41)	0.22 (0.41)	0.20 (0.40)	0.19 (0.39)
Sample size	62	535	378	177
Cohort II 8th graders				
4th-grade mathematics scaled score	645 (25)	644 (25)	646 (25)	646 (25)
4th-grade ELA scaled score	653 (28)	652 (29)	652 (29)	654 (28)
Free or reduced-price lunch	0.90 (0.30)	0.87 (0.33)	0.92 (0.27)	0.86 (0.35)
Black	0.90 (0.30)	0.89 (0.31)	0.88 (0.33)	0.90 (0.30)
Hispanic	0.08 (0.27)	0.07 (0.25)	0.09 (0.29)	0.06 (0.23)
English language learner	0.04 (0.20)	0.07 (0.25)	0.07 (0.26)	0.03 (0.18)
Male	0.49 (0.50)	0.46 (0.50)	0.42 (0.49)	0.39 (0.49)
Disabled	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Any prior test accommodation	0.04 (0.20)	0.07 (0.25)	0.09 (0.29)	0.02 (0.14)
4th-grade attendance rate	0.96 (0.03)	0.96 (0.04)	0.96 (0.04)	0.96 (0.03)
4th-grade ever suspended	0.12 (0.33)	0.13 (0.34)	0.17 (0.37)	0.12 (0.32)
Sample size	50	409	280	180
Cohort III 7th graders				
4th-grade mathematics scaled score	631 (29)	631 (31)	631 (30)	636 (26)
4th-grade ELA scaled score	646 (31)	647 (33)	646 (32)	652 (30)
Free or reduced-price lunch	0.92 (0.28)	0.94 (0.24)	0.94 (0.24)	0.92 (0.27)
Black	0.94 (0.24)	0.94 (0.24)	0.94 (0.23)	0.95 (0.22)
Hispanic	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.02 (0.15)
English language learner	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Male	0.44 (0.50)	0.45 (0.50)	0.48 (0.50)	0.43 (0.50)
Disabled	0.03 (0.16)	0.03 (0.18)	0.03 (0.17)	0.04 (0.18)
Any prior test accommodation	0.03 (0.18)	0.05 (0.21)	0.06 (0.23)	0.03 (0.16)
4th-grade attendance rate	0.95 (0.04)	0.95 (0.04)	0.95 (0.05)	0.95 (0.04)

Table 8 (continued)

	Kauffman School	All Kansas City public schools	Kansas City district schools	Kansas City charter schools
4th-grade ever suspended	0.19 (0.39)	0.16 (0.37)	0.17 (0.37)	0.14 (0.35)
Sample size	115	475	323	220
Cohort IV 6th graders				
4th-grade mathematics scaled score	634 (25)	634 (24)	635 (26)	631 (24)
4th-grade ELA scaled score	648 (31)	648 (29)	647 (31)	646 (28)
Free or reduced-price lunch	0.97 (0.17)	0.97 (0.16)	0.96 (0.18)	0.97 (0.18)
Black	0.90 (0.30)	0.90 (0.30)	0.89 (0.32)	0.89 (0.31)
Hispanic	0.06 (0.24)	0.06 (0.23)	0.06 (0.24)	0.08 (0.26)
English language learner	0.01 (0.11)	0.02 (0.12)	0.02 (0.14)	0.03 (0.18)
Male	0.44 (0.50)	0.43 (0.49)	0.48 (0.50)	0.45 (0.50)
Disabled	0.06 (0.24)	0.04 (0.20)	0.05 (0.22)	0.05 (0.22)
Any prior test accommodation	0.06 (0.23)	0.06 (0.24)	0.07 (0.26)	0.07 (0.25)
4th-grade attendance rate	0.95 (0.04)	0.96 (0.04)	0.95 (0.04)	0.95 (0.04)
4th-grade ever suspended	0.19 (0.40)	0.19 (0.39)	0.18 (0.38)	0.20 (0.40)
Sample size	158	533	341	239
Cohort V 5th graders				
4th-grade mathematics scaled score	2445 (67)	2444 (66)	2448 (70)	2436 (61)
4th-grade ELA scaled score	2447 (78)	2446 (81)	2448 (80)	2445 (80)
Free or reduced-price lunch	0.95 (0.21)	0.95 (0.22)	0.95 (0.22)	0.97 (0.18)
Black	0.90 (0.30)	0.90 (0.29)	0.90 (0.30)	0.89 (0.31)
Hispanic	0.06 (0.24)	0.06 (0.23)	0.06 (0.23)	0.08 (0.27)
English language learner	0.02 (0.14)	0.02 (0.15)	0.03 (0.16)	0.04 (0.19)
Male	0.49 (0.50)	0.48 (0.50)	0.48 (0.50)	0.43 (0.50)
Disabled	0.06 (0.25)	0.09 (0.28)	0.09 (0.28)	0.04 (0.20)
Any prior test accommodation	0.09 (0.29)	0.13 (0.34)	0.10 (0.30)	0.08 (0.28)
4th-grade attendance rate	0.95 (0.04)	0.95 (0.04)	0.95 (0.04)	0.95 (0.04)
4th-grade ever suspended	0.21 (0.41)	0.19 (0.39)	0.18 (0.38)	0.21 (0.41)
Sample size	145	675	484	249

Notes: The Kauffman characteristics and sample size represent the total number of Kauffman students matched to the full comparison group of students from all Kansas City public schools. Standard deviations are displayed in parentheses next to the averages in this table. No differences between averages for Kauffman students and comparison group students are significantly different from zero.

ELA = English language arts.

www.mathematica-mpr.com

***Improving public well-being by conducting high quality,
objective research and data collection***

PRINCETON, NJ ■ ANN ARBOR, MI ■ CAMBRIDGE, MA ■ CHICAGO, IL ■ OAKLAND, CA ■
TUCSON, AZ ■ WASHINGTON, DC ■ WOODLAWN, MD

MATHEMATICA
Policy Research

Mathematica® is a registered trademark
of Mathematica Policy Research, Inc.