



Center for Research in Educational Policy

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Student-Level Analysis of Year 2

(2004-2005) Achievement Outcomes for

Tennessee Charter Schools





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EXECUTIVE SUMMARY

This report presents student-level achievement results for two groups of schools in Tennessee: (a) four charter schools that began operation in 2003-2004--Circles of Success in Learning Academy (COSLA), Memphis Academy of Health Sciences (MAHS), Memphis Academy of Science and Engineering (MASE), Smithson-Craighead Academy--and (b) three new charter schools that were established in 2004-2005--City University School of Liberal Arts (CityU), Star Academy, and Yo! Academy. These two cohorts were therefore completing their second and first academic years, respectively, at the time the achievement tests were administered in spring 2005.

To conduct a rigorous and valid analysis of student achievement outcomes, we employed a matched program-control design at the student level in six of these seven schools. In this design, each charter school student was paired to a comparable "control" student who attended the same or a similar district school in the year prior to the former's charter school enrollment. In the sixth school, which comprised primary elementary grades only, pretest scores were unavailable for the majority of charter school students and potential matched pairs. Therefore, a comparison group was established by randomly selecting students who were identical in race and poverty status to the charter students and who attended comparable neighborhood schools. This report supplements an earlier report (Ross, McDonald, & Bol, 2005) on the implementation progress made by the charter schools, encompassing school climate, classroom teaching methods, and perceptions by teachers, principals, parents, and students.

Achievement Measures

The Tennessee Comprehensive Assessment Program: Achievement Test (TCAP/AT) scores were used to assess academic achievement of students who were in grades 2 to 8 during the 2004-2005 school year. For students in grades 9 to 12 during the 2004-2005 school year, the Tennessee Gateway Assessments were used as outcome assessments. According to the Tennessee High School Examinations Policy, the State Board requires that in order to earn a high school diploma, students must successfully pass assessments in the following three subject areas: Algebra I (usually completed in grade 9), English 10, and Biology (usually completed in 10th grade).

Summary and Conclusions

Overall, the analyses of achievement found mostly positive effects for the second-year charter schools but equivocal outcomes for the first-year schools. Regarding the latter, only Star Academy but neither of the two high schools (CityU or Yo! Academy) demonstrated significant¹ advantages or strong effect sizes relative to the control groups.

Results for the second-year Memphis schools were relatively consistent and clearly positive. Out of 18 school grade-level cohort x TCAP/AT subtest analyses, all effect sizes² were positive, with the median d 's = +0.38 in Reading/Language Arts and +0.43 in Mathematics. Effect sizes of these levels would be considered educationally strong and meaningful by researchers. Further, of these 18 analyses, 12 were statistically significant at $p < .05$. The implication is that students attending these charter schools are performing better than their peers who remained in traditional schools. In the Nashville school (Smithson-Craighead Academy), however, no statistically significant effects were found in Reading/Language Arts or Mathematics either of the grades examined (3rd and 4th), and the effect sizes were minimal.

As indicated in the first-year report (Ross, McDonald, & McSparrin-Gallagher, 2005), we encourage readers to interpret the results cautiously given that because of student choice and other constraints, we were unable to conduct a randomized experimental study that eliminated family interest or involvement as an influential factor, and (c) some grade-level matched-pair sample sizes (e.g., in COSLA, Smithson-Craighead, and Star Academy) were small and thus subject to sampling error.

To capsule the achievement outcomes obtained in this study, a brief achievement profile of each of the six schools is provided below:

First-Year Schools

¹ Statistical “significance” indicates effects considered “sufficiently” reliable, inferably due to actual differences and not due to chance (or sampling error).

² Effect sizes were computed by a formula called “Cohen’s d .” Each effect size (or d) indicates the number of standard deviations by which the charter school student mean differs from the control student mean. Thus, a effect size of say, +0.50, would indicate a half of a standard deviation advantage—a highly substantial educational impact. Generally, in education, effect sizes exceeding +0.20 would be considered meaningful and fair strong when obtained for a whole-school intervention.

City University School of Liberal Arts. Only Algebra I test scores could be analyzed; no effects or trends were found.

Star Academy. Significant or suggestive positive effects were found in both Reading/Language Arts and Mathematics.

Yo! Academy. No effects were found in English 10. Nor were effects found in Algebra I in grade 11, but a nonsignificant disadvantage in Algebra I was indicated in grade 10.

Second-Year Schools

Circles of Success in Learning Academy. Significant positive effects were evidenced in grade 1 Reading/Language Arts and Mathematics, and suggestive effects in grade 2 Mathematics. No effects were found in grade 3.

Memphis Academy of Health Sciences. Significant and moderate-to-strong positive effects were found across all grades 6 and 7 cohorts in both Reading/Language Arts and Mathematics.

Memphis Academy of Science and Engineering. Significant or suggestive positive effects were found across all grade 7 and 8 cohorts in both Reading/Language Arts and Mathematics. Effects were relatively more pronounced in Reading/Language Arts than in Mathematics, and for the 8th grade-Year 2 cohort than for the Year 1 7th and 8th grade cohorts.

Smithson-Craighead Academy. No effects were found in either Reading/Language Arts or Mathematics in either grade 3 or grade 4. However, slight directional advantages were evidenced for SCA students in Reading/Language Arts in both grades and in Mathematics in grade 4.

STUDENT-LEVEL ANALYSIS OF 2004-2005 ACHIEVEMENT OUTCOMES FOR TENNESSEE CHARTER SCHOOLS

This report presents student-level achievement results for the four Tennessee charter schools that began operation in TN in 2003-2004, and three new schools that were established in 2004-2005. (Table 1 presents an overview of the schools by cohort, and a more detailed, narrative description of each school follows the table.) These two cohorts were therefore completing their second and first academic years, respectively, at the time the achievement tests were administered in spring 2005. To conduct a rigorous and valid analysis of student achievement outcomes, we employed a matched program-control design at the student level in six of these schools. In this design, each charter school student was paired to a comparable “control” student who attended the same or a similar district school in the year prior to the former’s charter school enrollment. Such a design has the critical advantages of controlling for pre-program achievement and other relevant student and school variables. In the seventh school, which comprised primary elementary grades only, pretest scores were unavailable for the majority of charter school students and potential matched pairs. Therefore, a comparison group was established by randomly selecting students who were identical in race and poverty status to the charter students and who attended comparable neighborhood schools. This report supplements a previous report (Ross, McDonald, & Bol, 2005) on the implementation progress made by the charter schools, including school climate, classroom teaching methods, and perceptions by teachers, principals, parents, and students.

**Table 1.
Overview of Schools**

School	Level	Grades	Enrollment	Theme
<u>Year 1: 2004-2005</u>				
City University of School of Liberal Arts (CityU)	Secondary	9	118	College preparation
Star Academy	Elementary	K-2	116	Reading and language arts
Yo! Academy	Secondary	10-12	123	Integration of visual and performing arts
<u>Year 2: 2003-2004</u>				
Circles of Success Learning Academy (COSLA)	Elementary	K-3	72	Reading and language arts
Memphis Academy of Health Sciences (MAHS)	Middle	6-7	180	Integration of health sciences
Memphis Academy of Science & Engineering (MASE)	Middle	7-8	215	Science and engineering careers
Smithson-Craighead Academy	Elementary	K-4	148	Academic and social needs of at-risk students

Description of the Charter Schools

Year 1 Schools

City University School of Liberal Arts. City University School of Liberal Arts (CityU) is located in an urban area of Memphis, Tennessee, and is housed in Greater Middle Baptist Church. In its first year of operation, only grade 9 was established. African-American students constituted 98.26% of the school's population (there was also one Caucasian and one Hispanic student). Approximately 70% of students were eligible for free or reduced-price lunches.

The school's faculty and staff consisted of eight teachers, one principal, one office manager, one instructional leader, and one part-time counselor. The administration reported that the teacher-to-student ratio for core classes was 1:20 and for non-core classes was 1:30. The curriculum developed and employed at CityU has a

liberal arts core and is aligned with College Board standards to build a strong college-oriented focus. This theme is continued throughout CityU's operations, with teachers being referred to as "professors" and students as "scholars." Students change classes after each lecture is finished, not when a bell rings, and school policies reflect a more collegiate atmosphere (such as allowing cell-phone usage between classes). The educators at CityU described their primary goal as preparing students for college and providing them with an opportunity to learn in a highly positive atmosphere.

Star Academy. Star Academy is located in the northwest region of Shelby County on the outskirts of Memphis, Tennessee. The urban community maintains a variety of industries. Star Academy serves students in kindergarten through 2nd grade. The student population is predominantly (98%) African-American, with approximately 90% of the students qualifying for free or reduced-price lunch.

In 2004-2005, there were six classroom teachers at Star Academy, plus two other professional staff members. The latter included a Title I Coordinator and Curriculum Coordinator. There is a 20:1 student-teacher ratio across classrooms. All professional faculty were licensed in their respective areas of instruction. In its first year of operation, Star Academy's primary area of focus was Reading and Language Arts. The McGraw-Hill series comprised the core curricular materials in reading and math. For students identified as needing extra support, supplementary programs were used (Head Sprout and Failure Free Reading). A variety of instructional strategies, such as cooperative learning, peer tutoring, and direct instruction, were employed

Yo! Academy. Yo! Academy of Visual and Performing Arts ("the Academy" or "Yo! Academy") is located in southwest Memphis in an industrial warehouse area of the city. At the start of its first year of operation, the school held classes off-site. Academic classes met in space leased from a church approximately 6 miles north of the school building, while visual and performing arts classes met in the facility that housed the city's Youth Opportunity Movement (see below) program. By midyear, the school's own facility was adapted for secondary school use so that all classes could be conducted under a single roof. The school operated on a year-round calendar that included one Saturday per month.

During the first year of operation, the school served only students in tenth, eleventh, and twelfth grades. The school is scheduled to add ninth grade in its second year of operation. All students enrolled in 2004-2005 were African-American and approximately 90% were eligible for free or reduced-price meals. Nearly half of the students (49%) were tenth graders, over a third (37%) were eleventh graders, and the remainder (14%) were twelfth graders.

The faculty consisted of one principal, one assistant principal, seven teachers, two office staff members, and a case manager/psychologist. All were African-American. Both the principal and assistant principal also taught classes. All of the teachers had teaching certification, and the current principal was in the final stages of completing a doctoral degree in school leadership. Two teachers taught one course in which they were not certified. Since the beginning of the school year, the school has had four different principals. In addition, the original executive director of the sponsoring agency (Yo! Memphis Foundation) was replaced.

The mission of the school is to provide a rigorous academic preparation for students while incorporating the visual and performing arts, all in a safe environment for youths who are considered to be at-risk. Yo! Academy was established in Memphis under the aegis of a 5-year demonstration program funded by the U. S. Department of Labor called the Youth Opportunity Movement. Funding for that program concluded June 30, 2005. The school's focus on the visual and performing arts is a direct outgrowth of the success of the Youth Opportunity Memphis ("Yo! Memphis") program. In the Academy's first year, over half of its students had experience with Yo! Memphis. The director of the Yo! Memphis Show Choir continued in that capacity at the Academy while serving as the school's assistant principal. In 2004-2005, the program director for Yo! Memphis was also the executive director of the Yo! Memphis Foundation, which is the sponsoring agency for Yo! Academy. She also served as the school's principal.

Year 2 Schools

Circles of Success in Learning Academy (COSLA). The Circles of Success Learning Academy (COSLA) is an urban charter school located in Memphis, Tennessee. During the 2004-2005 school year, COSLA served students in grades K-3, 91.6% of whom were eligible for free or reduced-price lunch.

COSLA's staff consisted of four teachers, with a teacher-student ratio of 1:18. Other staff members included a principal, a curriculum facilitator, a Title I coordinator, an administrative assistant, and three teacher assistants. The general focus at COSLA is literacy development, which its school-wide program attempts to integrate across subject areas. The school uses scientifically-based methods and strategies in the delivery of the curriculum. Accordingly, curriculum content and performance standards are aligned with current school district and state assessment goals. The COSLA program also emphasizes use of a variety of teaching strategies. Organizational structures are designed to facilitate high levels of learning and therefore include the systematic monitoring of grade-level planning, classroom teaching practices, and student progress. Support structures include the incorporation of feedback from the principal and the curriculum facilitator, modeling of effective practices, provision of regular professional development opportunities for all staff as well as internal and external support services. COSLA uses the results of its annual evaluations to plan improvements for the upcoming year.

Memphis Academy of Health Sciences (MAHS). The Memphis Academy of Health Sciences (MAHS) is located in an urban area of Memphis, Tennessee, in Shelby County. Specifically, MAHS is housed in the upper floor of Caldwell Elementary School. In 2003-2004, it served grade 6 only; in 2004-2005, grade 7 was added. African American students made up 100% of the school's population. Approximately 75% of the students received free or reduced-price lunches.

The school's faculty and staff consisted of 12 teachers (including one special education teacher), one principal, and one secretary. The administration reported the teacher-student ratio as 1:20. The curriculum is a standards-based, interdisciplinary program that incorporates projects and experiential learning centered on a health science theme. Benchmarks established by the school for its second year of operation

primarily focused on establishing structures that enable effective implementation and evaluation of the instructional program, productive communication among stakeholders, and a positive environment for teaching and learning.

Memphis Academy of Science and Engineering (MASE). The Memphis Academy of Science and Engineering (MASE) is housed in the two upper floors of an office building in downtown Memphis. The seventh grade inhabits one floor and eighth grade the floor above. Students use stairs to travel between the floors.

During the 2004-2005 school year, grade 8 was added to the grade 7 established in 2003-2004. The students were predominantly African-American (97%) with a few White (2.3%) and Hispanic (0.7%) students. The gender distribution was 47.1% girls and 52.9% boys. Free or reduced-priced lunches were provided for 68% of the students. The school staff in 2004-2005 included 12 teachers, two support individuals, three administrators, and one employee having both administrative and support duties. The administration consisted of a principal, a vice principal, and an educational specialist.

The program includes longer days, Saturday school, high technology use, continuous monitoring of student progress, and an intense focus on core curricula integrated across subjects. Mathematics, science, and language arts are emphasized using authentic, varied, and integrated instruction and assessment strategies. The schedule entails a full day of school (8 am -5 pm) so that all classes can meet twice. In the afternoon, the students extended, practiced, finished, or repeated the morning's lessons. Community projects (excursions) were added to allow for students to experience real-life applications of their classroom work.

Smithson-Craighead Academy (SCA). Smithson-Craighead Academy, an urban school in Nashville, TN, serves 148 students in kindergarten through fourth grade. The students are predominantly (99%) African-American. All students are eligible for free (90%) or reduced-price (10%) lunches. The student body is classified by the administrators and teachers as "at-risk."

Staff and faculty of the school include 10 teachers and 5 teaching assistants. Other staff members include the principal, a curriculum coordinator and four specialists: librarian, special education teacher, computer instructor, and computer/special

education coordinator. The founder, Sister Sandra Smithson, provides administrative and instructional consultation. In the spring, 2005, an additional staff member was hired to serve as a liaison between parents and school personnel. The majority (73.7%) of faculty/staff reported that their education culminated in either a bachelor's (31.6%) or a master's (42.1%) degree. Experience as a school employee ranged from 5 years or less (57.9%) to over 20 years (21.1%). Over half (68.4%) have had 1-10 years of experience. The same percentage (68.4%) have had more than one year of experience at SCA.

The focus of the school is to meet the academic and social needs of at-risk children. Students are taught three goals: self-control, work before play, and obey your teachers. They recite these goals on a daily basis. The curriculum for the lower grades includes benchmark testing to ensure mastery of basic skills before proceeding to more advanced skills. The scope and sequence of the curriculum is based on both research-supported practices and state curriculum standards. Teachers are given the latitude to use innovative strategies to meet the school's educational goals. A daily, after-school program is available to provide students with additional educational support. Many teachers and administrators participate in the after-school program.

Method

Design

Given the different grade levels served and curricular objectives emphasized by the six charter schools, the results for each were analyzed separately. Except that used for COSLA (see below), each analysis used a matched program-control design at the student level, where charter school students were matched with non-charter students on all or most of seven criteria: 2003-2004 enrollment at the same traditional school that the charter school student had attended, grade level, race, gender, lunch status, and scores of prior achievement as assessed via the TCAP/AT for reading and mathematics (+/- 5 Normal Curve Equivalents). The matching process for Smithson-Craighead varied somewhat, in that the mean of TCAP/AT NCEs or scale scores was used as the matching variable for prior student achievement.

In each analysis, a small percentage of students were not able to be matched on all criteria. In those instances, matches were made on three criteria: prior achievement, grade level, and race. Accordingly, for a small number of pairs lunch status or gender differed. When an appropriate match for a charter school student could not be found from his/her former (2002-2003 or 2003-2004) school, the closest match from one of the schools formerly attended by his/her present classmates was selected using all other criteria. Group equivalence on achievement variables at baseline was confirmed with one-way ANOVAs for each subject area within each school sample. Effect sizes were calculated on these pre-program achievement scores to confirm the similarities between charter and control student groups. Correlations of pre- to post-implementation achievement scores were also carried out by subject area within each school sample. Further details of the matching process for each school are included in the Results section (below).

Because achievement tests differed by grade level, we conducted separate analyses for each grade, with one exception (Yo! Academy), using Analysis of Covariance (ANCOVA) or Multivariate Analysis of Covariance (MANCOVA) where prior achievement (pretest) scores were available, or ANOVA or MANOVA where there were no pretest scores. Because the same outcome measures, Algebra I Gateway scores, were available for the Yo! Academy tenth and eleventh graders, we conducted a two-

way ANCOVA in which the independent variables were grade level (10 and 11) and program (charter or control). Effect sizes were calculated for both unadjusted and adjusted mean differences within each subject area within each school sample.

Achievement Measures

Assessments of academic achievement utilized the TCAP/AT scores for students who were in grades 2 to 8 during the 2004-2005 school year. The TCAP/AT is administered each spring to students in grades 2 to 8 in all Memphis City Schools and to students in grades 3 to 8 state-wide. For students in grades 9 to 12 during the 2004-2005 school year, the Tennessee Gateway Assessments were used as outcome assessments. According to the Tennessee High School Examinations Policy, the State Board requires that in order to earn a high school diploma, students must successfully pass assessments in three subject areas: Algebra I (usually completed in 9th grade), English 10, and Biology (usually completed in 10th grade). The Gateway Assessments are criterion-referenced measures that indicate students' proficiencies based on minimum passing scores for designation as *Proficient* or *Advanced*. *Proficient* is defined as an ability level equivalent to the minimum skill attainment needed to earn a passing grade in a given subject area. *Advanced* levels of proficiency are considered to be equivalent to earning a letter grade of B or higher in the course of interest. Students scoring below the minimum required for proficiency are considered *Not Proficient*. This lowest level is considered equivalent to earning a failing letter grade in the course. While each Gateway test consists of 55 items, the number of items that must be answered correctly in order to be scored at *Proficient* or *Advanced* differs by subject level and by the date the test was administered, as summarized below.

Test	Testing Period	Proficient		Advanced	
		# Items	%	# Items	%
Algebra I	12/04 to 07/05	30	54.5	42	76.4
English 10	12/04	26	47.3	40	72.7
	05/05	25	45.4	39	70.9
	07/05	24	43.6	38	69.1

Students first attempt these Gateway assessments while enrolled in the course for which they are assessed. Should a student fail the Gateway Assessment on this initial attempt, additional opportunities to complete the assessment are provided in the

summer following course completion. Students may also elect to retake the Gateway Assessment during one of three testing periods offered during each subsequent school year.

Results

City University School of Liberal Arts

As indicated above in the school descriptions, City University School of Liberal Arts (CityU) is a college preparatory high school that began operation in 2004-2005 with ninth grade students only. There were a total of 118 students enrolled, of whom 98.3% ($n = 116$) were African-American (there were two Caucasian students). The student body was 57.6% female, with 66.9% qualifying for free or reduced-price lunch.

For the analysis of student achievement, students' Normal Curve Equivalent (NCE) scores in Reading and Mathematics from the 2003-2004 TCAP/AT were used as the baseline assessment. The NCE is a standard score distribution with a mean of 50 and a standard deviation of approximately 21.

Because CityU students were in the ninth grade during the 2004-2005 school year, the only achievement outcome measure available was the Tennessee Gateway Algebra I tests. For all students in the analysis, only those attempts at the Gateway Algebra I test made during the 2004-2005 school year were used. The total number of items that students answered correctly was used as the measure of academic achievement.

Matched-Pair Samples

Of the 118 students enrolled at CityU, 44 had completed the Algebra I Gateway during the 2004-2005 school year. For the matching process, 31 of these 44 students were matched on all seven criteria. Of the remaining 13 students, 10 were matched on all but 2003-2004 location; 2 were discrepant on both location and meal status (charter students on reduced-price meals versus control students on full-price meals); and 1 was matched on all but lunch status (charter student = reduced price meals; control student = full-price).

Mathematics Outcomes

Baseline comparability of the charter and control groups was confirmed with a one-way ANOVA of 2003-2004 TCAP/AT mathematics NCE scores ($F = 0.001$, $p = 0.976$). The low effect size confirmed this between-group comparability ($d = -0.006$). Baseline descriptive statistics are found in Table 2. Correlations between pre- and post-implementation achievement scores showed a moderate to strong correlation of $r = +0.62$ ($p < 0.001$) (see Table 3).

Table 2.
2003-2004 Baseline Achievement Scores in Reading and Math for Charter and Control Students by School and Grade

School	Group	Reading			Mathematics		
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
City U^a							
	Charter students				44	49.14	10.87
	Control students				44	49.20	10.50
	Effect Size				<i>d</i> = -0.006		
	One-way ANOVA				<i>MS</i> =0.102; <i>F</i> =0.001; <i>p</i> =0.976		
Star Academy							
	Charter students	16	47.94	19.16	16	40.06	17.71
	Control students	16	47.19	19.27	16	40.75	18.44
	Effect Size	<i>d</i> = 0.04			<i>d</i> = -0.039		
	One-way ANOVA	<i>MS</i> =4.500; <i>F</i> =0.012; <i>p</i> =0.913			<i>MS</i> =3.781; <i>F</i> =0.012; <i>p</i> =0.915		
Yo! Academy							
10th Grade	Charter students	61	51.23	12.37	16	35.25	10.29
	Control students	61	50.72	11.84	16	34.44	9.76
	Effect Size	<i>d</i> = 0.04			<i>d</i> = 0.08		
	One-way ANOVA	<i>MS</i> =7.877; <i>F</i> =0.054; <i>p</i> =0.817			<i>MS</i> =5.281; <i>F</i> =0.053; <i>p</i> =0.820		
11th Grade	Charter students				10	21.90	11.48
	Control students				10	21.40	11.64
	Effect Size				<i>d</i> = 0.045		
	One-way ANOVA				<i>MS</i> =1.250; <i>F</i> =0.009; <i>p</i> =0.924		
MAHS							
6 th Grade (1 st Year)	Charter students	78	40.31	14.34	78	38.33	14.42
	Control students	78	40.32	14.11	78	38.26	13.93
	Effect Size	<i>d</i> = -0.000			<i>d</i> = +0.005		
	One-way ANOVA	<i>MS</i> =.006; <i>F</i> =0.000; <i>p</i> =0.996			<i>MS</i> =.231; <i>F</i> =0.001; <i>p</i> =0.973		
7 th Grade (1 st Year)	Charter students	30	40.63	12.59	30	38.57	15.29
	Control students	30	40.60	12.73	30	38.73	14.80
	Effect Size	<i>d</i> = +0.002			<i>d</i> = -0.011		
	One-way ANOVA	<i>MS</i> =.017; <i>F</i> =0.000; <i>p</i> =0.992			<i>MS</i> =0.417; <i>F</i> =0.002; <i>p</i> =0.966		
7 th Grade (2 nd Year)	Charter students	42	42.76	19.14	42	42.64	14.97
	Control students	42	42.71	18.54	42	42.71	16.05
	Effect Size	<i>d</i> = +0.002			<i>d</i> = -0.004		
	One-way ANOVA	<i>MS</i> =.048; <i>F</i> =0.000; <i>p</i> =0.991			<i>MS</i> =.107; <i>F</i> =0.000; <i>p</i> =0.983		

Table 2, continued.
2003-2004 Baseline Achievement Scores in Reading and Math for Charter and Control Students by School and Grade

School	Group	Reading			Mathematics		
		<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
MASE							
7 th Grade (1 st Year)	Charter students	91	49.77	15.15	91	47.44	16.84
	Control students	91	49.68	15.21	91	47.35	16.51
	Effect Size One-way ANOVA	<i>d</i>=0.006 <i>MS</i> =0.352; <i>F</i> =0.002; <i>p</i> =0.969			<i>d</i>=0.005 <i>MS</i> =0.417; <i>F</i> =0.002; <i>p</i> =0.966		
8 th Grade (1 st Year)	Charter students	25	51.92	14.68	25	50.48	13.66
	Control students	25	52.20	14.77	25	50.72	13.22
	Effect Size Oneway ANOVA	<i>d</i>=-0.019 <i>MS</i> =0.980; <i>F</i> =0.005; <i>p</i> =0.947			<i>d</i>=-0.018 <i>MS</i> =0.720; <i>F</i> =0.004; <i>p</i> =0.951		
8 th Grade (2 nd Year)	Charter students	99	60.31	16.06	99	51.14	15.14
	Control students	99	60.19	15.87	99	51.75	14.79
	Effect Size One-way ANOVA	<i>d</i>=0.008 <i>MS</i> =0.727; <i>F</i> =0.003; <i>p</i> =0.957			<i>d</i>=-0.041 <i>MS</i> =18.182; <i>F</i> =0.081; <i>p</i> =0.776		
Smithson-Craighead							
3 rd Grade (2 nd Year) ^b NCEs	Charter students	27	35.19	11.30	27	31.78	14.36
	Control students	27	40.44	12.43	27	29.93	17.64
	Effect Size One-way ANOVA	<i>d</i>=-0.451 <i>MS</i> =373.407; <i>F</i> =2.647; <i>p</i> =0.110			<i>d</i>= 0.117 <i>MS</i> =46.296; <i>F</i> =0.179; <i>p</i> =0.674		
4 th Grade (2 nd Year) Scale Scores	Charter students	26	439.23	39.295	26	438.15	18.454
	Control students	26	448.08	21.376	26	438.69	23.375
	Effect Size One-way ANOVA	<i>d</i>=-0.285 <i>MS</i> =1017.308; <i>F</i> =1.017; <i>p</i> =0.318			<i>d</i>=-0.026 <i>MS</i> =3.769; <i>F</i> =0.008; <i>p</i> =0.927		

^a For CityU, only mathematics achievement was analyzed because English or reading posttest scores were unavailable for its ninth graders.

^b Language NCEs at baseline were not significantly different (*d*=0.017; *MS*=0.907; *F*=0.004; *p*=0.950)

Table 3.
Baseline-Posttest Correlations by Charter School and Subject

School	Subject	Baseline	Posttest	Corr.	Prob.
CityU					
	Mathematics	2003-2004 TCAP/AT Math NCE	Gateway Algebra I number of items correct	0.620	<0.001
Star Academy					
	Reading	2003-2004 TCAP/AT Reading NCE	2004-2005 TCAP/AT Reading NCE	0.582	<0.001
	Mathematics	2003-2004 TCAP/AT Math NCE	2004-2005 TCAP/AT Math NCE	0.622	<0.001
Yo! Academy					
	Reading	8th Grade TCAP/AT Reading NCE	Gateway English 10 number of items correct	0.460	<0.001
10 th Grade	Mathematics	8th Grade TCAP/AT Math NCE	Gateway Algebra I number of items correct	0.258	0.155
11 th Grade	Mathematics	8th Grade TCAP/AT Math NCE	Gateway Algebra I number of items correct	0.106	0.656
COSLA^a					
2 nd Year	2nd Grade	Reading 2003-04 TCAP NCE	Reading 2004-05 TCAP NCE	.174	.309
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP NCE	.473	.004
2 nd Year	3rd Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.617	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP # Correct	.604	<.001
MAHS					
1 st Year	6th Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.616	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP # Correct	.727	<.001
1 st Year	7th Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.575	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP # Correct	.768	<.001
2 nd Year	7th Grade	Reading 2002-03 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.703	<.001
		Math 2002-03 TCAP NCE	Math 2004-05 TCAP # Correct	.778	<.001
MASE					
1 st Year	7th Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.744	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP # Correct	.802	<.001
1 st Year	8th Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.711	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP # Correct	.810	<.001
2 nd Year	8th Grade	Reading 2002-03 TCAP NCE	Reading/LA 2004-05 TCAP # Correct	.694	<.001
		Math 2002-03 TCAP NCE	Math 2004-05 TCAP # Correct	.760	<.001

Table 3, continued.
Baseline-Posttest Correlations by Charter School and Subject

School	Subject	Baseline	Posttest	Corr.	Prob.
Smithson-Craighead					
2 nd Year	3 rd Grade	Reading 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP Scale Score	0.506	<.001
		Language 2003-04 TCAP NCE	Reading/LA 2004-05 TCAP Scale Score	0.370	<.001
		Math 2003-04 TCAP NCE	Math 2004-05 TCAP Scale Score	0.670	<.001
2 nd Year	4 th Grade	Reading/LA 2003-04 TCAP Scale Score	Reading/LA 2004-05 TCAP Scale Score	0.485	<.001
		Math 2003-04 TCAP Scale Score	Math 2004-05 TCAP Scale Score	0.613	<.001

^a COSLA pretests were not included in the achievement analyses because of small sample sizes for control students.

Descriptive statistics on the Gateway Algebra I “posttest” assessment for the CityU and control students are provided in Table 4. Standard and adjusted effect sizes are also given. The low adjusted effect size ($d = -0.06$) is indicative of the outcomes of the ANCOVA (Table 4), where no significant difference was found between charter school students and control group students in their levels of mathematics achievement, $F(1, 85) = 0.088, p = 0.768$. As expected, the pretest covariate was highly significant, $F(1, 85) = 53.23, p < 0.001$.

Table 4.
2003-2005 “Posttest” Achievement Scores in Reading and Math for Charter and Control Students by School and Grade

School	Group	Reading				Mathematics			
		<i>N</i>	<i>M</i>	<i>SD</i>	Adj. <i>M</i>	<i>N</i>	<i>M</i>	<i>SD</i>	Adj. <i>M</i>
CityU^a									
9 th Grade	Charter students					44	38.11	6.71	38.13
	Control students					44	38.52	8.40	38.51
	Effect Size					<i>d</i>=-0.05			
	Adj. Effect Size					<i>d</i>=-0.06			
Star Academy^b									
2 nd Grade	Charter students	16	46.06	12.56	45.91	16	51.50	15.23	51.73
	Control students	16	38.19	13.33	38.34	16	34.56	19.64	34.33
	Effect Size	<i>d</i>=0.63				<i>d</i>=0.99			
	Adj. Effect Size	<i>d</i>=0.74				<i>d</i>=1.42***			
Yo! Academy^c									
10 th Grade	Charter students	61	37.89	5.89	37.82	16	29.50	6.022	28.81
	Control students	61	37.25	6.90	37.31	16	33.00	6.643	32.41
	Effect Size	<i>d</i>=0.10				<i>d</i>=0.57			
	Adj. Effect Size	<i>d</i>=0.09				<i>d</i>=0.548			
11 th Grade	Charter students					10	26.00	6.633	26.99
	Control students					10	26.30	6.584	27.35
	Effect Size					<i>d</i>=0.048			
	Adj. Effect Size					<i>d</i>=0.056			
COSLA^{b,d}									
3 rd Grade	Charter students	16	28.13	6.67	NA	16	31.25	6.62	NA
	Control students	19	27.00	8.75	NA	19	30.95	7.67	NA
	Effect Size	<i>d</i>=0.129				<i>d</i>=0.039			
	Adj. Effect Size	NA				NA			
2 nd Grade	Charter students	16	45.63	18.73	NA	16	52.94	15.16	NA
	Control students	20	45.25	14.29	NA	20	41.75	18.85	NA
	Effect Size	<i>d</i>=0.027				<i>d</i>=0.594			
	Adj. Effect Size	NA				NA			
1 st Grade	Charter students	19	69.53	20.90	NA	19	54.05	18.06	NA
	Control students	20	50.50	15.69	NA	20	38.70	18.26	NA
	Effect Size	<i>d</i>=1.213**				<i>d</i>=0.841*			
	Adj. Effect Size	NA				NA			

Table 4, continued.
2003-2005 "Posttest" Achievement Scores in Reading and Math for Charter and Control Students by School and Grade

School	Group	Reading				Mathematics			
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>Adj. M</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
MAHS^b									
6 th Grade (1 st Year)	Charter students	78	32.64	7.76	32.64	78	34.71	8.37	34.69
	Control students	78	26.27	8.01	26.27	78	29.85	8.30	29.86
	Effect Size	<i>d</i>=0.792				<i>d</i>=0.586			
	Adj. Effect Size	<i>d</i>=0.795***				<i>d</i>=0.582***			
7 th Grade (1 st Year)	Charter students	30	31.17	9.06	31.18	30	33.23	8.89	33.27
	Control students	30	26.30	9.66	26.28	30	28.50	7.96	28.46
	Effect Size	<i>d</i>=0.504				<i>d</i>=0.594			
	Adj. Effect Size	<i>d</i>=0.501*				<i>d</i>=0.604**			
7 th Grade (2 nd Year)	Charter students	42	34.38	8.93	34.38	42	32.76	8.51	32.77
	Control students	42	27.64	8.67	27.64	42	29.50	8.71	29.49
	Effect Size	<i>d</i>=+0.777				<i>d</i>=+0.374			
	Adj. Effect Size	<i>d</i>=+0.777**				<i>d</i>=+0.376**			
MASE^b									
7 th Grade (1 st Year)	Charter students	91	35.68	7.39	35.66	91	38.24	7.08	38.31
	Control students	91	31.92	9.88	31.94	91	35.92	9.19	35.85
	Effect Size	<i>d</i>=0.381				<i>d</i>=0.148			
	Adj. Effect Size	<i>d</i>=0.377***				<i>d</i>=0.144			
8 th Grade (1 st Year)	Charter students	25	36.16	6.96	36.22	25	38.24	7.08	38.31
	Control students	25	32.32	7.64	32.26	25	35.92	9.19	35.85
	Effect Size	<i>d</i>=0.503				<i>d</i>=0.252			
	Adj. Effect Size	<i>d</i>=0.518*				<i>d</i>=0.268			
8 th Grade (2 nd Year)	Charter students	99	35.68	7.26	35.71	99	38.13	8.51	38.25
	Control students	99	33.64	8.78	33.60	99	34.40	9.21	34.28
	Effect Size	<i>d</i>=0.232				<i>d</i>=0.405			
	Adj. Effect Size	<i>d</i>=0.240*				<i>d</i>=0.431***			

Table 4, continued.

2003-2005 "Posttest" Achievement Scores in Reading and Math for Charter and Control Students by School and Grade

School	Group	Reading				Mathematics			
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>Adj. M</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Smithson-Craighead									
3 rd Grade (2 nd Year)	Charter students	27	469.85	28.60	471.96	27	448.74	19.44	448.83
	Control students	27	469.04	21.58	466.93	27	450.93	24.36	450.84
	Effect Size	<i>d</i>=0.033				<i>d</i>=-0.101			
	Adj. Effect Size	<i>d</i>=0.230				<i>d</i>=-0.128			
4 th Grade (2 nd Year)	Charter students	26	460.42	30.95	462.08	26	472.42	27.00	472.80
	Control students	26	458.81	34.41	457.15	26	463.54	25.81	463.16
	Effect Size	<i>d</i>=0.050				<i>d</i>=0.343			
	Adj. Effect Size	<i>d</i>=0.181				<i>d</i>=0.465			

^a Gateway Algebra I assessments were used as the follow-up measures of achievement. No reading scores were available for the CityU cohort.

^b TCAP/AT NCE scores in Reading/Language Arts and Mathematics from 2004-2005 were used as the follow-up measures.

^c Because of small sample sizes and other scores, 11th grade Yo! Academy students were excluded from the English 10 analyses.

^d Because pretest scores were not available, no adjusted means or adjusted effect sizes were computed.

* $p < .05$

** $p < .01$

*** $p < .001$

Gateway Proficiency Levels

Table 5 displays Gateway proficiency levels attained for charter students as compared to the matched control school students. Chi-square tests of between group differences were nonsignificant ($\chi^2(2) = 4.130, p = 0.127$). For charter students, 93.2% scored either *Proficient* or *Advanced* on the Gateway Algebra I assessment, compared to 84.1% of control group students.

Table 5.
Two-way chi-square results examining the relationship between Group (charter vs. control) and Posttest Proficiency Level

School	Subject Area	Group	Below Proficient		Proficient		Advanced		Chi Square
			<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
CityU									
	Algebra I	Charter students	3	6.8	28	63.6	13	29.5	4.13
		Control students	7	15.9	19	43.2	18	40.9	
Yo! Academy									
10 th Grade	English 10	Charter students	1	1.6	27	44.3	33	54.1	0.749
		Control students	2	3.3	30	49.2	29	47.5	
10 th Grade	Algebra I	Charter students	8	50.0	7	43.8	1	6.2	1.222
		Control students	5	31.3	10	62.5	1	6.2	
11 th Grade	Algebra I	Charter students	8	50.0	2	20.0	0	0	0
		Control students	8	50.0	2	20.0	0	0	
MAHS 6 th Grade 1 st Year									
	Reading/LA	Charter students	5	6.4	56	71.8	17	21.8	20.842**
		Control students	20	25.6	56	71.8	2	2.6	
	Math	Charter students	8	10.3	54	69.2	16	20.5	12.278*
		Control students	17	21.8	58	74.4	3	3.8	
MAHS 7 th Grade 1st Year									
	Reading/LA	Charter students	3	10.0	20	66.7	7	23.3	4.061
		Control students	9	30.0	17	56.7	4	13.3	
	Math	Charter students	4	13.3	21	70.0	5	16.7	4.614
		Control students	9	30.0	20	66.7	1	3.3	
MAHS 7 th Grade 2 nd Year									
	Reading/LA	Charter students	2	4.8	23	54.8	17	40.5	13.871**
		Control students	10	23.8	28	66.7	4	9.5	
	Math	Charter students	6	14.3	30	71.4	6	14.3	2.667
		Control students	12	28.6	24	57.1	6	14.3	

Table 5, continued.

Two-way chi-square results examining the relationship between Group (charter vs. control) and Posttest Proficiency Level

School	Subject Area	Group	Below Proficient		Proficient		Advanced		Chi Square
			<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
MASE 7 th Grade 1st year									
	Reading/LA	Charter students	3	3.3	56	61.5	32	35.2	8.343*
		Control students	14	15.4	53	58.2	24	26.4	
	Math	Charter students	7	7.7	58	63.7	26	28.6	3.685
		Control students	15	16.5	49	53.8	27	29.7	
MASE 8 th Grade 1st year									
	Reading/LA	Charter students	0	0.0	16	64.0	9	36.0	2.630
		Control students	2	8.0	17	68.0	6	24.0	
	Math	Charter students	0	0.0	17	68.0	8	32.0	2.097
		Control students	2	8.0	16	64.0	7	28.0	
MASE 8 th Grade 2nd year									
	Reading/LA	Charter students	3	3.0	52	52.5	44	44.4	5.843
		Control students	12	12.1	47	47.5	40	40.4	
	Math	Charter students	4	4.0	52	52.5	43	43.4	8.972*
		Control students	9	9.1	66	66.7	24	24.2	
Smithson-Craighead 3 rd Grade 2 nd Year									
	Reading/LA	Charter students	4	14.8	19	70.4	4	14.8	0.803
		Control students	5	18.5	20	74.1	2	7.4	
	Math	Charter students	11	40.7	14	51.9	2	7.4	1.902
		Control students	15	55.6	9	33.3	3	11.1	
Smithson-Craighead 4 th Grade 2 nd Year									
	Reading/LA	Charter students	10	38.5	16	61.5	0	0	2.600
		Control students	11	44.0	12	48.0	2	8.0	
	Math	Charter students	9	34.6	16	61.5	1	3.8	1.669
		Control students	12	48.0	11	44.0	2	8.0	

* $p < .05$

** $p < .01$

Star Academy

Matched-Pair Samples

Star Academy is a college preparatory elementary school that began its inaugural year with students in grades K-2. For the 2004-2005 school year, 116 students were enrolled, comprising 39 Kindergarteners, 39 first graders, and 38 second graders. Overall, half of the students were male, and 99.14% were African-American. There was one Hispanic child in the first grade group. In addition, 87.1% of the students overall received free or reduced-price meals.

Of the 116 students enrolled at Star Academy, only 16 of the second-grade students had TCAP/AT scores from the 2003-2004 school year. Of these, only 3 students were matched with control students on all seven matching criteria. Of the remaining students, 10 required matches with control students from school locations other than their home school in 2003-2004. In addition, one male student was matched with one female student from a different school; one charter student on reduced-price meals was matched with one control on full-price meals; and one charter student differed from his/her control counterpart on 2003-2004 location and meal status (charter was reduced-price, control was on free meals). In all 16 matches, prior achievement, grade level, and race were matched. Because of the small number of students available for the analysis, separate analyses of reading and mathematics achievement outcomes were done via ANCOVAs as opposed to one MANCOVA.

Reading and Mathematics Outcomes

Baseline assessments of student achievement used students' NCE scores in Reading/Language Arts and Mathematics from the 2003-2004 TCAP/AT. One-way ANOVAs performed on baseline achievement scores confirmed the adequacy of the matching process in both reading and mathematics (Reading: $F = 0.012$, $p = 0.913$; Math: $F = 0.012$, $p = 0.915$). Small effect sizes added further evidence of a close match, with $d = +0.04$ for Reading/Language Arts, and $d = -0.039$ for Mathematics. Baseline descriptive results are found in Table 2. Correlations between achievement scores baseline to post-charter school intervention were moderate to strong, with $r = +0.582$ ($p < 0.001$) for Reading/Language Arts and $r = +0.622$ ($p < 0.001$) for Mathematics (see Table 3).

Post-charter school achievement was based on TCAP/AT NCE scores from 2004-2005. A depiction of these data, including both adjusted and unadjusted effect sizes for the mean group differences, is found in Table 4. Differences in Reading/Language Arts achievement were marginally significant, $F(1,29) = 4.154$, $p = 0.051$, with a strong adjusted effect size of $d = +0.744$. The adjusted mean NCE for the Star Academy students was 45.91 versus 38.34 for the control group students. It is likely that the small sample size limited the power of this analysis to detect a statistically significant between-group difference.

In the area of mathematics achievement, charter students demonstrated a significant advantage over matched controls, $F(1,29) = 15.059$, $p < 0.001$. A correspondingly large adjusted effect size of $d = +1.42$ suggests an educationally strong and meaningful effect on 2004-2005 achievement. Star Academy students' adjusted mean NCE in mathematics for 2004-2005 was 51.73 compared to control students' adjusted mean NCE of only 34.33.

Yo! Academy

Matched-Pair Samples

Yo! Academy, a high school for at-risk students, offers a focus on visual and performing arts. For the school's first year (2004-2005), 123 tenth through twelfth grade students were enrolled, including 71 tenth graders, 42 eleventh graders, and 10 twelfth-graders. All students were African-American, and 87.8% qualified for free or reduced-price meals.

As all these students were in upper grades, TCAP/AT NCEs for reading and mathematics for each student's eighth-grade year were used as indicators of prior achievement. Therefore, the matching process entailed attempting to match on the following seven criteria: eighth grade TCAP/AT for reading and mathematics (± 5 NCEs), 2003-2004 enrollment at the same school that the charter school student formerly attended, grade level, race, gender, and lunch status.

Gateway assessments were used as posttest measures of program impact on student academic achievement. Only those students (both charter and control students) who completed either an Algebra I and/or English 10 Gateway test during the 2004-2005 school year were considered for the analysis. The total number of items

answered correctly on the Gateway tests was used in each analysis. Only 20 Yo! Academy students with matched controls had taken both the Algebra I and English 10 Gateway assessments. Therefore, separate ANCOVAs were performed by subject area, rather than employing a MANCOVA for both subject areas.

For the analysis of reading skills, 64 Yo! Academy students had matched controls. Out of these 64 students, 47 were matched with controls on all targeted variables. Of the remaining 17 students, 8 were matched with controls in different locations in 2003-2004; 7 were matched controls with different meal status designations (3 charter students = reduced-price meals but their matched controls = free meals; 3 charter students = free meals but controls = full price meals; and 1 charter student = free meals but control = reduced-price meals); and the 2 remaining students were matched with controls on all variables except prior school location and meal status (1 charter student = reduced-price meals but control = full price; and 1 charter student = free meals but the control = full price).

These 64 matched students comprised 61 tenth graders and 3 eleventh graders. Grade-level differences in baseline TCAP/AT NCEs were found, with tenth-grade charter students averaging 51.23 ($SD = 12.37$) and tenth-grade controls averaging 50.72 ($SD = 11.84$). In contrast, eleventh graders at Yo! Academy averaged 17.33 ($SD = 11.59$) NCE on their eighth-grade TCAP/AT, whereas controls averaged 17.33 ($SD = 13.32$). Given these strong grade-level differences and the extremely low eleventh-grade performances, the three eleventh-grade matched pairs were dropped from the analysis.

For the analysis of math achievement, the study population comprised 26 Yo! Academy students with Algebra I Gateway scores from 2004-2005, with 16 students in tenth grade and 10 in eleventh grade. Of these, 15 students were matched with control students on all variables. An additional 8 charter students were matched on all but school location in 2003-2004, and 3 students were matched on all but meal status (1 charter student = reduced-price meals but control = free meals; 1 charter student = free meals but control = full price; and 1 charter student = full price but control = free meals). Due to the relatively even split of the sample by grade level, descriptive data are summarized by grade level, and a two-way, Group (charter or control) and Grade Level

(10th or 11th) ANCOVA, with eighth grade TCAP/AT Mathematics NCE as the covariate, was performed on the Algebra I Gateway Scores.

Reading and Mathematics Outcomes

Comparability of tenth-grade charter and control students' baseline assessments of academic achievement in reading was verified with a one-way ANOVA performed on eighth-grade TCAP/AT Reading/Language Arts NCE scores ($F = 0.054$, $p = 0.817$). A correspondingly low effect size of $d = +0.04$ further confirmed the baseline group similarity (see Table 2). Even though 2 years had elapsed from the date of the eighth-grade baseline TCAP/AT achievement assessment to the time of the follow-up Gateway test, the correlation of TCAP/AT Reading/Language Arts NCE scores with Gateway English 10 scores was moderately strong ($r = +0.460$, $p < 0.001$) (see Table 3). Unadjusted and adjusted posttest means are shown for the charter and control groups in Table 4. The low adjusted effect size ($d = +0.09$) is consistent with ANCOVA outcomes showing no significant group differences in Gateway English 10 achievement between charter and control students, $F(1,119) = 0.248$, $p = 0.620$. The pretest covariate was the only significant source of variance ($p < 0.001$).

A summary of students' Gateway proficiency levels for the English 10 assessments completed during the 2004-2005 school year is provided in Table 5. A chi-square test of the relationship between Group (charter vs. control) and Performance Level was nonsignificant, $\chi^2(2) = 0.749$, $p = 0.688$. Over 98% of charter students and 96.7% of the control students score at *Proficient* or *Advanced* levels.

For the Algebra I analysis, baseline TCAP/AT NCE scores for the charter school and control groups are shown in Table 2. One-way ANOVAs were performed on each grade level to ensure similarity on this baseline assessment (10th grade: $F = 0.053$, $p = 0.820$, $d = +0.08$; 11th grade: $F = 0.009$, $p = 0.924$, $d = +0.045$). The correlation of baseline to follow-up assessments of mathematics achievement was weak for both the tenth-grade group ($r = +0.258$, $p = 0.155$) and the eleventh-grade group ($r = +0.106$, $p = 0.656$) (see Table 3). As with the English 10 assessments, there was a 2- to 3-year lag between pre- and post-assessments.

Table 4 summarizes group means and effect sizes for posttest (2004-2005) Gateway Algebra I assessments. The adjusted effect size for the tenth-grade sample

was moderately to strongly negative (adjusted $d = -0.548$), thus suggesting a directional advantage for the control group. For the eleventh graders, Gateway scores differed little by group (adjusted $d = -0.056$). In the ANCOVA, the eighth grade pretest covariate was not significant ($p = .153$), mirroring the weak pretest-posttest correlation described above (see Table 3). More critically, no significant main effects were found in Algebra I achievement either by Group, $F(1,47) = 1.191, p = 0.281$, or by Grade Level, $F(1,47) = 2.580, p = 0.115$. The interaction of Group and Grade Level was also nonsignificant, $F(1,47) = 0.796, p = 0.377$.

Gateway Proficiency Levels

A summary of 2004-2005 Gateway proficiency levels for Algebra I assessments is provided in Table 5. For tenth graders, there was no relationship between Group (charter vs. control) and Performance Level, $\chi^2(2) = 1.222, p = 0.543$. Half (50%) of the tenth-grade Yo! Academy students scored at the *Proficient* or *Advanced* levels compared with 68.7% of the tenth-grade control students. For eleventh graders, there were no group differences in the number of students scoring at *Proficient* (8 out of 10 in each group) or *Advanced* (2 out of 10 in each).

Circles of Success in Learning Academy (COSLA)

COSLA and Comparison Group Samples

Enrollment at COSLA consisted of 20 first graders, 20 second graders, and 19 third graders. Of these, newly enrolled (first-year) students consisted of 1 first grader, 4 second graders, and 3 third graders. Because these transfer cohorts were so small, in contrast to those for MAHS and MASE above, we decided not to include them in the analyses. In the final grade levels samples of 19, 16, and 16, all students were African American and qualified for free or reduced-price lunch. Given that TCAP/AT testing begins in grade 2 in Memphis City Schools and is optional for schools to administer in grade 1, only a very small number of students had “pretest” scores reflecting their achievement prior to enrolling in COSLA. Therefore, it was not possible to establish a matched-pair “control” group as done for the other charter schools. Instead, we created a “comparison” group by randomly selecting African American students who qualified for free or reduced-price lunch from the same traditional schools that the third-grade COSLA students had attended (in 2002-2003) prior to their charter school enrollment.

Reading and Mathematics Outcomes

Due to the small sample sizes, we conducted separate ANOVAs within grades on the Reading/Language Arts and Mathematics posttest scores. Posttest means, standard deviations, and effect sizes are summarized in Table 4.

Posttest outcomes for grade 1. The univariate ANOVAs revealed significant results favoring COSLA students in Reading/Language Arts, $F(1,37) = 10.41, p = .003$, and Mathematics, $F(1,37) = 6.96, p = .012$. Effect sizes reflected strong advantages in both subjects (respective ES 's = +1.21 and +0.84).

Posttest outcomes for grade 2. The ANOVAs yielded nonsignificant outcomes reflecting fairly comparable means ($ES = +0.03$) for both groups in Reading/Language Arts, $F(1,34) = 0.01, p = .946$, but a directional advantage ($ES = +0.59$) for COSLA in Mathematics, $F(1,34) = 3.71, p = .06$.

Posttest outcomes for Grade 3. The univariate ANOVAs revealed nonsignificant results in both Reading/Language Arts, $F(1,33) = .177, p = .68$, and Mathematics, $F(1,33) = 0.02, p = .90$). The associated effect sizes of +0.13 and +0.04 were indicative of small program impacts.

Summary of COSLA outcomes. Advantages for COSLA were statistically significant and strong for both Reading/Language Arts and Mathematics in grade 1. The associated effect sizes were +1.21 and +0.84, respectively. Given the small sample sizes, the nonsignificant grade 2 advantage for COSLA in Mathematics (+0.59) also seems suggestive of positive impacts. However, effects were small and close to zero in Reading/Language Arts in grade 2 and in both subjects in grade 3.

Memphis Academy of Health Sciences (MAHS)

Matched-Pair Samples

MAHS implements a standards-based program that incorporates interdisciplinary projects and experiential learning centered on a health science theme. In the present, second year of operation it included grades 6 and 7, in which student enrollments were 78 and 72, respectively. In the Year 1 matched-pairs achievement study, 70 matched sixth-grade charter-control student pairs were established. Of these, for the 2004-2005 school year, 6 dropped out of the school district, 10 transferred to another location, 5 had missing achievement data for 2004-2005, and 7 lost their control school matches as

a result of the latter failing a grade. The remaining longitudinal sample for the Year 2 (2004-2005) seventh-grade analysis thus consisted of 42 matched pairs from Year 1. In addition, 30 new seventh graders enrolled in MAHS in 2004-2005 and were matched to control school counterparts. Fifteen pair differed only on pretest school location. For the sixth-grade analysis, all 78 new enrollees were matched to control school counterparts. Forty pair differed on pretest school location.

Reading and Mathematics Outcomes

To ensure comparability of MAHS and control group cohorts, pretest NCE scores in Reading/Language Arts and Mathematics were compared between groups for the 6th grade-Year 1 cohort, the 7th grade-Year 1 cohort, and the 7th grade-Year 2 cohort. As summarized in Table 2, the MAHS and control students, as expected, performed nearly identically on all tests, with all *ES*'s approximating zero and all ANOVA outcomes nonsignificant. Both groups scored below the national norm of 50, with the mean NCE's ranging from the high 30's to low 40's. As may be seen in Table 3, the pretest-posttest correlations for the MAHS grade-level by subject were moderately strong to strong, ranging from $r = +.575$ to $+0.778$.

For the analysis of program effects on posttest scores, a multivariate analysis of covariance (MANCOVA) was performed, separately by cohort, on the 2004-2005 CRT TCAP/AT Reading/Language Arts and Mathematics subtests. Posttest means, standard deviations, and effect sizes are summarized in Table 4.

Posttest outcomes for 6th grade-Year 1 cohort. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's $<.001$). The multivariate effect of program was also significant, $F(2,151) = 31.32, p < .001$. Follow-up univariate ANCOVAs revealed significant results for both Reading/Language Arts, $F(1,152) = 52.31, p <.001$, and Mathematics, $F(1,152) = 30.64, p < .001$. Adjusted effect sizes for Reading/Language Arts and Mathematics were $+0.795$ and $+0.582$, respectively, thereby reflecting fairly strong program effects.

Posttest outcomes for 7th grade-Year 1. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's $< .01$). The multivariate effect of program was also significant, $F(2,55) = 7.20, p < .001$. Univariate ANCOVAs revealed significant results for both Reading/Language Arts,

$F(1,56) = 7.16, p = .01$, and Mathematics, $F(1,56) = 13.20, p = .001$. Adjusted effect sizes for Reading/Language Arts and Mathematics were +0.501 and +0.604, respectively, reflecting fairly strong program effects (see Table 4).

Posttest outcomes for 7th grade-Year 2. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's < .001). The multivariate effect of group (MAHS or Control) was also significant, $F(2,79) = 16.98, p < .001$. Univariate ANCOVAs were significant for both Reading/Language Arts, $F(1,80) = 33.97, p < .001$, and Mathematics, $F(1,80) = 9.16, p = .003$, favoring MAHS students. Adjusted effect sizes for Reading/Language Arts and Mathematics were +0.78 and +0.38, respectively, again reflecting strong program effects, especially in Reading/Language Arts (see Table 4).

TCAP/AT proficiency levels. A supplementary analysis was performed to examine the percentages of MAHS and control students who scored at *Below Proficient, Proficient, and Advanced* levels on the spring 2004-2005 CRT Reading/Language Arts and Mathematics subtests. Summaries appear in Table 5. Two-way chi square (program x proficiency level) analyses, all favoring MAHS, were significant for the 7th grade-Year 2 students in Reading/Language Arts only, and 6th grade-Year 1 students in both subjects. Higher percentages of MAHS than control students tended to score *Proficient* and *Advanced* in both Reading/Language Arts and Mathematics.

Summary of MAHS outcomes. For all three cohorts, strong program effects were obtained. In Reading/Language Arts, the three effects sizes were +0.795, +0.501, and +0.78 for the 6th grade-Year 1, 7th grade-Year 1, and 7th grade-Year 2 cohorts, respectively. In Mathematics, the respective effect sizes were +0.582, +0.60, and +0.38. In two of the MAHS cohorts (6th grade-Year 1 and 7th grade-Year 2), significantly higher percentages of MAHS students than control students scored *Proficient* or *Advanced* in one or more subjects.

Memphis Academy of Science and Engineering (MASE)

Matched-Pair Samples

MASE focuses on preparing high school students for science and engineering careers via emphases on science, mathematics, and technology. In its second year of operation, it enrolled 124 students in grade 7 and 91 students in grade 8. In the Year 1 matched-pairs achievement study, 134 matched seventh-grade charter-control student pairs were established. Of these, 11 dropped out of the school district, 17 transferred to another location, 5 were eliminated as a result of their matched control counterparts being retained, and 2 were eliminated as a result of their being retained. The remaining longitudinal sample for the Year 2 (2004-2005) eighth-grade analysis thus consisted of 99 matched pairs from Year 1. In addition, 25 new eighth graders enrolled in MASE in 2004-2005 and were matched to control-school counterparts. A single pair differed on pretest school enrollment. For the seventh-grade analysis, all 91 new enrollees were matched to control-school counterparts. Thirty-two pair differed on pretest school location.

Reading and Mathematics Outcomes

Pretest NCE scores in Reading/Language Arts and Mathematics were compared between groups for the above three MASE cohorts. As summarized in Table 2, the MASE and control students performed nearly identically on all tests, with all effect sizes approximating zero and all ANOVA outcomes nonsignificant. Both eighth-grade cohorts (MASE and matched controls), but particularly the second-year enrollees, scored above the national norm of 50 in Reading/Language Arts and Mathematics, with the mean NCE's ranging from 51.92 to 60.31. The seventh-grade cohorts, however, scored slightly below the national norm. Pretest-posttest correlations by grade-level and subject were moderately strong to strong, ranging from $r = +0.694$ to $+0.810$ (see Table 3).

For the analysis of program effects on posttest scores, a multivariate analysis of covariance (MANCOVA) was performed, separately by cohort, on the 2004-2005 CRT TCAP/AT Reading/Language Arts and Mathematics subtests. Posttest means, standard deviations, and effect sizes are summarized in Table 4.

Posttest outcomes for 7th grade-Year 1. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's $< .001$). The multivariate program effect was also significant, $F(2,177) = 10.92$, $p < .001$. Follow-up univariate ANCOVAs revealed results significantly favoring MASE students in Reading/Language Arts, $F(1,178) = 21.95$, $p < .001$, and directionally favoring them in Mathematics, $F(1,178) = 3.20$, $p < .08$. Adjusted effect sizes were +0.38 in Reading/Language Arts, indicating a moderate to strong effect, and +0.14 in Mathematics, reflecting a weak effect.

Posttest outcomes for 8th grade-Year 1. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's $< .001$). The multivariate effect of program was also significant, $F(2,45) = 5.07$, $p = .01$. Similar to the seventh-grade results, the univariate ANCOVAs revealed significant results favoring MASE students in Reading/Language Arts, $F(1,46) = 8.30$, $p = .01$, but only a nonsignificant directional advantage in Mathematics, $F(1,46) = 3.63$, $p = .06$. Adjusted effect sizes for Reading/Language Arts and Mathematics were +0.52 and +0.27, respectively, reflecting moderate to strong effects (see Table 4).

Posttest outcomes for 8th grade-Year 2. The Reading/Language Arts and Mathematics covariates were both highly significant in the MANCOVA (both p 's $< .001$). The multivariate program effect was also significant, $F(2,193) = 13.20$, $p < .001$. Significant univariate effects favoring MASE students were obtained in both Reading/Language Arts, $F(1,194) = 7.67$, $p = .01$, and Mathematics, $F(1,194) = 26.17$, $p < .001$. Adjusted effect sizes for Reading/Language Arts and Mathematics were +0.24 and +0.43, respectively, reflecting moderate to strong effects (see Table 4).

TCAP/AT proficiency levels. Chi-square analyses of the percentages of MASE and control students who scored at *Below Proficient*, *Proficient*, and *Advanced* levels on the 2004-2005 TCAP/AT subtests were significant for the eighth grade-Year 2 students in Mathematics only, and for the seventh grade-Year 1 students in Reading/Language Arts only. Higher percentages of the MASE than control students scored *Proficient* or *Advanced* on these tests.

Summary of MASE outcomes. For all three cohorts, statistically significant and moderate to strong effects (ranging from $ES = +0.24$ to +0.52), were obtained in

Reading/Language Arts, an area strongly emphasized by the school's curriculum for grades 7 and 8. The advantages in Mathematics were significant only for the eighth grade-Year 2 cohort ($ES = +0.43$). For the seventh grade-Year 1 ($ES = +0.14$) and the eighth grade-Year 1 ($ES = +0.27$) cohorts, only modest directional advantages were indicated. However, the seventh grade-Year 1 MASE students were significantly more likely than control students to perform at *Proficient* and *Advanced* levels in Reading/Language Arts. The eighth grade-Year 2 MASE students significantly surpassed the control group in scoring at *Proficient/Advanced* levels in Mathematics.

Smithson-Craighead Academy (SCA)

Matched-Pair Samples

The focus of Smithson-Craighead Academy is to meet the social and academic achievement needs of at-risk students. In its second year of operation, its enrollment consisted of approximately 150 students in five grades—Kindergarten through fourth. Pretest scores on TCAP:AT were available for the majority of third and fourth graders only, thereby limiting the analyses to those two grades. Due to the relatively small number of enrollees per grade level and the sampling attrition associated with creating matched pairs of SCA and control students, we conducted the analyses using all available matched pairs per grade, combining both “cohort” students (those continuing from 2003-04) and new students (initially enrolling in 2004-05).³

As with the other charter schools evaluated, SCA-control student matching variables included grade level, race, gender, lunch status, special education program membership, ELL status, and prior TCAP achievement. Specifically, the latter, achievement pretest indices included: (a) the mean NCE scores on the 2003-04 Reading, Language, and Mathematics subtests of the NRT assessment on TCAP/AT for grade 2 students, and (b) the mean number correct on the 2003-04 Reading/Language Arts and Math CRT TCAP/AT for grade 3 students.. Prior year school location was not included as a matching variable. For grades 2 and 3, it was possible to derive 27 and 26 matched pairs, respectively.

³ Separate analyses for these subgroupings are being conducted for exploratory purposes and will be included in an addendum to this evaluation report.

Reading and Mathematics Outcomes

Pretest NCE and number correct scores were compared between groups for the third- and fourth-graders, respectively. As summarized in Table 2, the SCA and control students performed nearly identically on all tests, with minimal effect sizes and all ANOVA outcomes nonsignificant. Noting the NCE means for third grade, both the SCA and control students, with M's ranging from approximately 30 to 40, scored well below the national norm of 50. These outcomes corroborate the academically at-risk status of the student populations concerned. As may be seen in Table 3, the pretest-posttest correlations for grade-level by subject ranged from $r = +.323$ to $+0.670$.

For the analysis of program effects on posttest scores, a multivariate analysis of covariance (MANCOVA) was performed, separately by grade level, on *scale scores* from the 2004-2005 CRT TCAP/AT Reading/Language Arts and Mathematics subtests. Posttest means, standard deviations, and effect sizes are summarized in Table 4. Covariates were the pretest scores described above for the respective grade levels.

Posttest outcomes for 3rd grade. The MANCOVA performed on Reading/Language Arts and Mathematics was not significant, $F(2,51) = 0.638$, $p = .533$. As shown in Table 4, the SCA and control group means were very comparable, while showing a small directional advantage for SCA students in Reading/Language Arts (adjusted $d = +0.230$) and for control students (adjusted $d = -0.128$) in Mathematics.

Posttest outcomes for 4th grade. The MANCOVA performed on Reading/Language Arts and Mathematics was not significant, $F(2,49) = 1.320$, $p = .277$. However, SCA students demonstrated a small directional advantage in both Reading/Language Arts (adjusted $d = +0.181$) and in Mathematics (adjusted $d = +0.465$). As shown, in Table 5, there were no significant trends in the percentages of SCA and control students who scored at Proficient and Advanced levels on the TCAP:AT subtests.

Summary of SCA outcomes. For both grades 3 and 4, no significant differences between SCA and matched control students were found. SCA students, however, demonstrated directional advantages in Reading/Language Arts in both grades and in

Mathematics in grade 4. It should be noted that the in each grade, relatively small sample sizes reduce the power for detecting program effects.

Summary and Conclusions

Overall, the analyses of achievement indicate mostly positive effects for the second-year charter schools but equivocal outcomes for the first-year schools. Regarding the latter, only Star Academy but neither of the two high schools demonstrated significant advantages or strong effect sizes relative to the control group. In the implementation study report (Ross, McDonald, & Bol, 2005), strengths and weaknesses of these charter school programs in their first year of operation are discussed. However, separate from programmatic issues, it seems likely that the assessment of achievement effects may be less sensitive at the secondary level than in earlier grades because of the nature of the Gateway tests, which are highly subject specific (i.e., explicitly associated with Algebra I, English 10, and Biology) and can be taken multiple times by students. Particularly at the high school level, a charter school's success in providing effective teaching and learning may be reflected more meaningfully across a wider range of subjects and broader educational outcomes such as attendance, graduation rates, and college enrollments. These indices will be examined in supplementary analyses.

Results for the second-year schools were relatively consistent and clearly positive. For the three Memphis schools, out of 18 school grade-level cohort x TCAP/AT subtest analyses (see Table 4), all effect sizes were positive, with median *ES*'s of +0.38 in Reading/Language Arts and +0.43 in Mathematics. Effect sizes of these levels would be considered educationally strong and meaningful by researchers. Further, of these 18 analyses, 12 were statistically significant at $p < .05$. The implication is that students attending these charter schools are performing higher than their peers who remained in traditional schools. For the Nashville school (Smithson-Craighead Academy), no statistically significant effects were found in Reading/Language Arts or Mathematics either of the grades examined (3rd and 4th), and the effect sizes were minimal. However, SCA students showed slight directional advantages over control students in three out of the four grade-level x subject comparisons.

As indicated in the first-year report (Ross, McDonald, & McSparrin-Gallagher, 2005), we encourage readers to interpret the results cautiously given that because of student choice and other constraints, we were unable to conduct a randomized experimental study that eliminated family interest or involvement as an influential factor; and (c) some grade-level matched-pair sample sizes (e.g., in COSLA, Smithson-Craighead, and Star Academy) were small and thus subject to sampling error.

To capsule the achievement outcomes found in this study, a brief achievement profile of each of the six schools is provided below:

First-Year Schools

City University School of Liberal Arts. Only Algebra I could be analyzed; no effects or trends were found.

Star Academy. Significant or suggestive positive effects were found in both Reading/Language Arts and Mathematics.

Yo! Academy. No effects were found in English 10. No effects were found in Algebra I in grade 11, but a nonsignificant disadvantage in Algebra I was indicated in grade 10.

Second-Year Schools

Circles of Success in Learning Academy (COSLA). Significant positive effects were evidenced in grade 1 Reading/Language Arts and Mathematics, and suggestive positive effects in grade 2 Mathematics. No effects were found in grade 3.

Memphis Academy of Health Sciences (MAHS). Significant and moderate-to-strong positive effects were found across all grades 6 and 7 cohorts in both Reading/Language Arts and Mathematics.

Memphis Academy of Science and Engineering (MASE). Significant or suggestive positive effects were found across all grade 7 and 8 cohorts in both Reading/Language Arts and Mathematics. Effects were relatively more pronounced in Reading/Language Arts than in Mathematics, and for the eighth grade-Year 2 cohort than for the Year 1 seventh and eighth grade cohorts.

Smithson-Craighead Academy. No reliable effects were found in either Reading/Language Arts or Mathematics in grade 3 or grade 4. Slight directional

advantages were evidenced for SCA students in Reading/Language Arts in both grades and in Mathematics in grade 4.

References

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