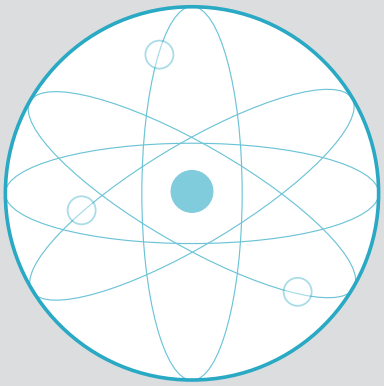

The First Graduating Class of the Science Leadership Academy: The Class of 2010

Quantitative Outcomes

Prepared for The Franklin Institute

March 30, 2012

RESEARCH for *ACTION*

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The Science Leadership Academy (SLA) is a small selective-admission high school in the School District of Philadelphia. The school is grounded in values of inquiry and care, and distinguishes itself with its inquiry-driven and project-based pedagogy, its use of technology, and its partnership with The Franklin Institute (TFI), a Philadelphia-based science museum and educational center. In the spring of 2011, TFI and SLA commissioned Research for Action (RFA) to conduct a pilot study of its activities focusing on:

(1) the SLA educational and partnership model to inform strategies for replication, and

(2) the experiences of the Class of 2010 and how they fared in their first postsecondary year.

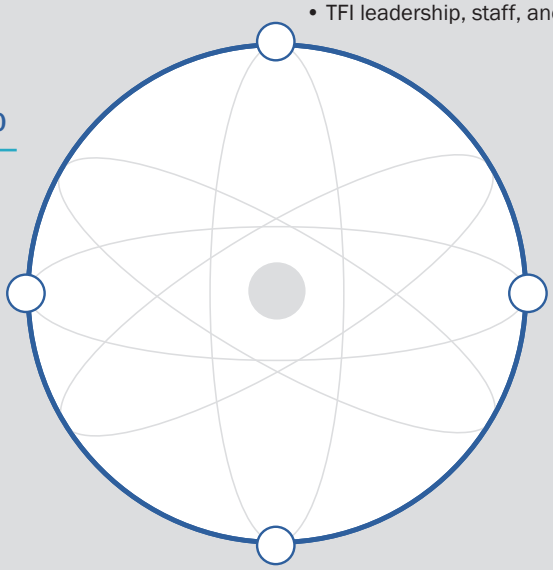
In the multi-method pilot study, RFA gathered and analyzed data from the following sources:

Interviews and Focus Groups

- Members of Class of 2010 (N=12/115)
- Current SLA seniors (N=13/125) and parents (N=6/125)
- SLA leadership and staff (N=16/25)
- TFI leadership, staff, and volunteers (N=12)

Online Survey of Class of 2010

- Distributed in Fall of 2011
- Items cover college transition and reflections on SLA experience
- N=49



Document Review

- SLA website
- Parent Night Handbook
- Teacher lesson plans

School District student data

- Academic outcomes for the class of 2010 from their 8th grade year through graduation.
- Outcomes include course grades, PSSA scores, attendance, courses taken

For further detail on research methodology, see Appendix A.

This is one of two research briefs produced by RFA to report on findings from the 10-month, mixed-method pilot study. The second, "The First Graduating Class of the Science Leadership Academy: Class of 2010," can be found at www.researchforaction.org, and addresses the high school and first-year college experiences of SLA's first graduating class.

In this research brief, RFA examines the elements unique to SLA's model.

About Research for Action

Research for Action (RFA) is a Philadelphia-based nonprofit organization. We seek to use research as the basis for the improvement of educational opportunities and outcomes for traditionally underserved students. Our work is designed to strengthen public schools and postsecondary institutions; provide research-based recommendations to policymakers, practitioners, and the public at the local, state, and national levels; and enrich the civic and community dialogue about public education. For more information, please visit our website at www.researchforaction.org.

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The First Graduating Class of the Science Leadership Academy: Class of 2010

March 30, 2012

The result of a unique partnership between the Franklin Institute Science Museum and the School District of Philadelphia, Philadelphia's Science Leadership Academy (SLA) opened as a brand new high school in the fall of 2006 with its first cohort of ninth grade students. Four years later, this cohort became the school's first graduating class. In interviews, alumni from the Class of 2010 articulated having very positive experiences during their four years at SLA and expressed a strong fondness for the school. They described a caring and supportive atmosphere that offered intellectually challenging and engaging learning experiences. The majority of those we interviewed also described the ways that their experiences at SLA helped them develop clarity about their future career paths.

Many of SLA's structures and processes, however, were still evolving when the Class of 2010 was enrolled. Alumni described themselves as "guinea pigs" and noted that key aspects of the SLA model have been modified since they were students. SLA's teachers and principal described learning important lessons in the school's first four years about where the model needed tweaking. SLA elements that have seen the most change since the Class of 2010 matriculated are illustrated in Table 1. The experiences of the Class of 2010 outlined in Table 1 are described in more detail later. For more detail on the "Model as of 2011-12," see RFA's first research brief: "Inquiry + Care = Science Leadership Academy."

Table 1. Key Changes since the Class of 2010

Element of SLA's model	Experience of Class of 2010	SLA model as of 2011-12
Admissions	In its first year, SLA had yet to develop a strong reputation and had fewer applicants than in subsequent years. As a result, the Class of 2010 represents a less selective group than more recent cohorts, though still high-achieving relative to students in Philadelphia's non-selective high schools.	The pool of applicants has increased, and SLA has become more selective.
Assessment	Members of the Class of 2010 took few if any tests while at SLA and were instead evaluated based on papers and projects. This created challenges when they encountered tests in college.	Science and math teachers now give assessments to check that their students have mastered each content standard.
TFI Partnership	As freshmen at SLA, students spent Wednesday afternoons at the Franklin Institute participating in large group museum tours or IMAX movie screenings. A majority of those we interviewed from the	SLA recently now has a liaison responsible for improving the communication and collaboration between SLA and TFI. Also, "Wednesdays at the Franklin" now split students into small groups for six-week mini-

	Class of 2010 said the large-group activities did not feel connected to their SLA coursework, were not well planned, and/or were not engaging.	courses, reducing the amount of time spent in large-group activities.
Internships (ILPs) and Capstone Projects	Since its founding, SLA has matched each tenth and eleventh grader with an Individual Learning Plan (ILP)—usually an internship or class that the student attends once a week. In the school's early years, ILP opportunities were more limited, and several alumni told us their ILP was uninteresting or a poor fit. Similarly, when talking about the Capstone projects, which students complete in their senior year, members of the Class of 2010 said that while the Capstone concept was good, they wished for better guidance in selecting and completing their projects.	SLA has expanded its partnerships with organizations around the city to offer a wider range of ILPs and Capstone options.
College Transition Supports	Those we interviewed from the Class of 2010 said they received support from SLA adults in the college application process, particularly from their advisors, but also wished for clearer information. SLA school leadership and staff acknowledged that they were learning as they went with the first cohort of seniors.	The SLA principal, teachers, and counselor are becoming more familiar with colleges—and better guiding students to schools that are good fits, affordable, and within reach. Additionally, SLA is gaining a positive reputation among college recruiters.

Despite these modifications, the core values and foundational components of the SLA model have remained constant since its establishment. This research brief provides a look at the experiences of SLA's first graduating class which, while unique, offers insights to SLA and other STEM platform and inquiry-based schools about strengths and challenges of the model. We tell the story of the Class of 2010 in four sections:

1. SLA Admissions and Student Background
2. High School Outcomes
3. Transition to College
4. Early College Outcomes

SLA Admissions and Student Background

The admissions process for SLA's first ninth grade class was less selective than in subsequent years. Even so, the first class was similar to subsequent classes in gender and race/ethnicity, and was overall a high-achieving group. In focus groups, alumni gave multiple reasons for enrolling at SLA, with the three most common being:

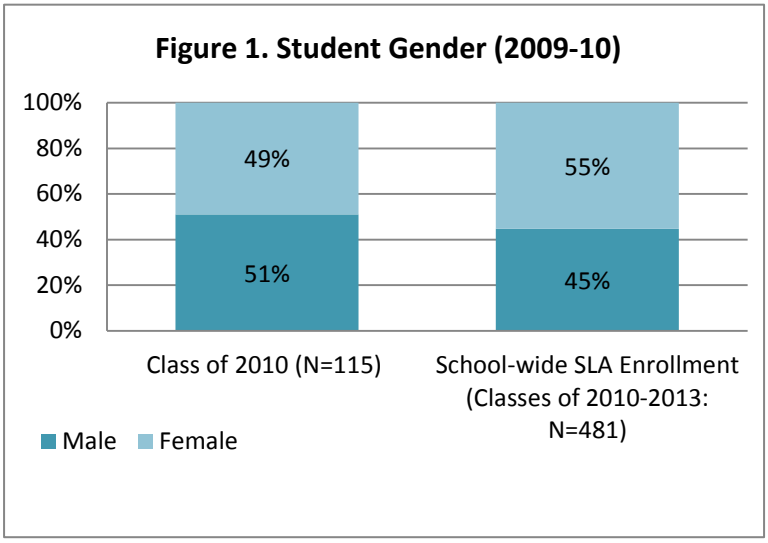
1. The principal had made a positive impression on them.
2. They were excited to attend a brand new school.
3. They were interested in science.

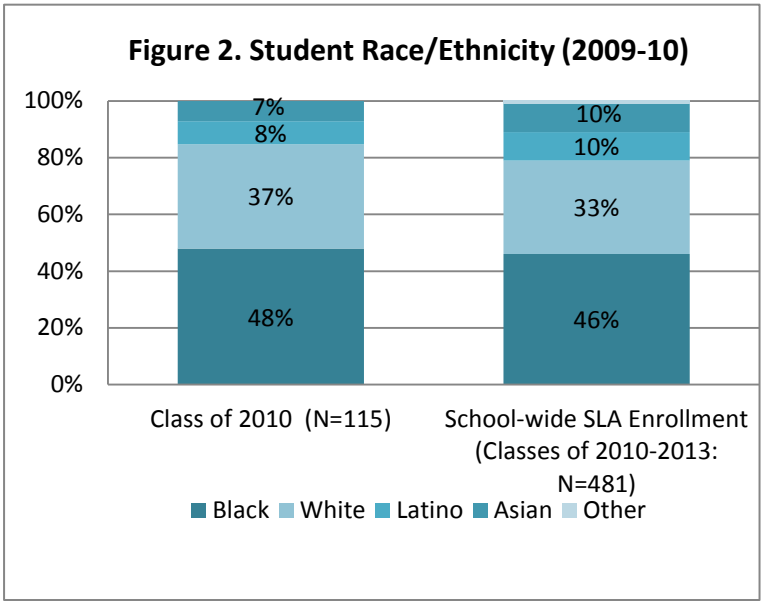
The figures in this section describe the first cohort in terms of demographics and eighth grade academic performance.[1]

Demographics

The composition of the Class of 2010 closely mirrored the school-wide SLA 2009-2010 population by gender and race/ethnicity.

Figures 1 and 2 suggest that subsequent classes had similar racial and gender demographics to the class of 2010, despite a growing applicant pool.



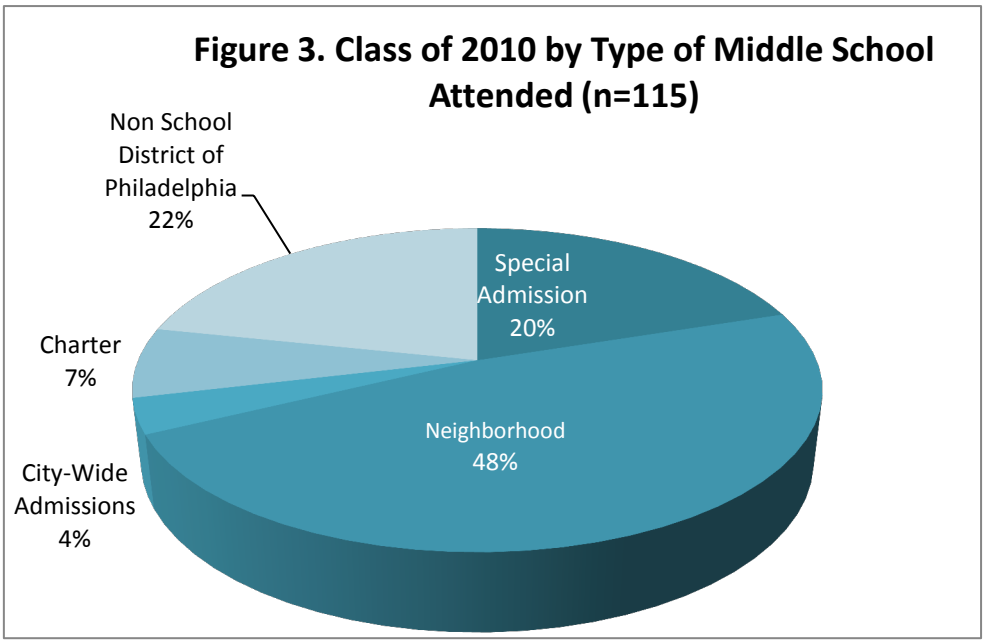


[1] Data in figures are from student record data for 115 students identified by the School District of Philadelphia as members of the SLA Class of 2010.

Student Eighth Grade Academic Profile

Prior to enrolling at SLA, the large majority (78%) of the Class of 2010 attended District middle schools, primarily neighborhood schools.

Neighborhood schools enroll all students within their catchment areas, while special admission, city-wide admission, and charter schools each have application and admission processes.[2] Figure 3 shows the variety of types of middle schools attended by members of the Class of 2010 for eighth grade. Just under a quarter (22%) attended a private schools, parochial schools, or public schools in districts outside Philadelphia.



The majority of the Class of 2010 scored well on their eighth grade state standardized tests.

Figures 4 and 5 show eighth grade scores on the PSSA (Pennsylvania System of School Assessment) for math and reading for the Class of 2010 as a whole and by gender group. The School District of Philadelphia did not report 8th grade PSSA data for over 20% of SLA's first cohort. These students may have not taken the PSSA in 8thgrade (e.g. were absent or attended middle schools that did not administer the PSSA) or their scores are missing. The figures show the following for Class of 2010 students with PSSA scores from eighth grade:

- The vast majority of students in the graduating Class of 2010 were identified as proficient and above in math (90%, n=81) and reading (91%, n=83).
- Less than 10% of students scored below proficient in math (8%) and reading (7%).

[2] By law, charter schools admit applicants from across the city by computerized lottery. Citywide and special admission schools are both selective based on merit, with special admission being the most selective type of school in the District.

- Proficiency levels in eighth grade did not vary significantly by gender, although the percentage of males identified as "advanced" (67%, n=33) was higher than females in math (56%, n=23).

Figure 4. Class of 2010: 8th Grade Reading PSSA Proficiency Levels by Gender

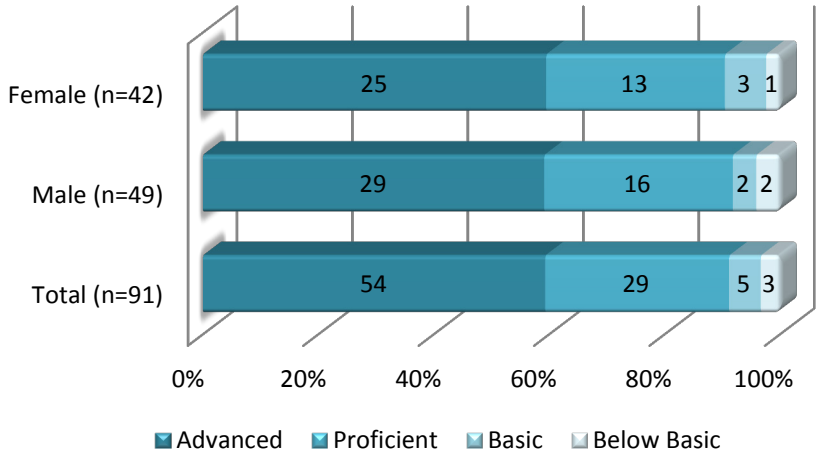
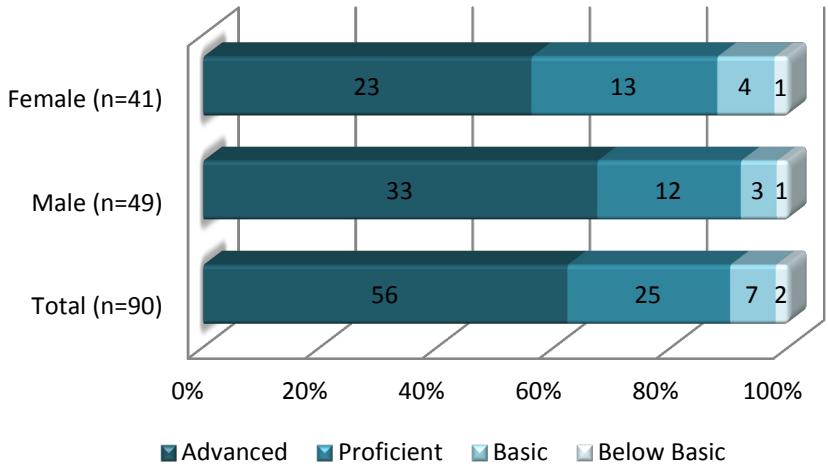


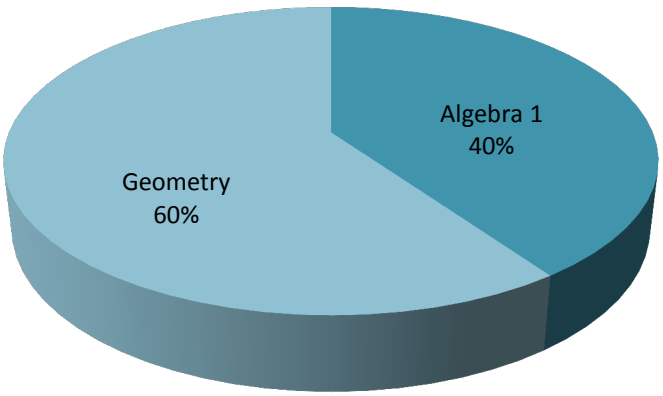
Figure 5. Class of 2010: 8th Grade Math PSSA Proficiency Levels by Gender



The majority of the Class of 2010 had completed Algebra I prior to admission to SLA and were placed in Geometry as 9th graders.

Freshman year math-course placement was associated with students' likelihood to graduate from high school ready to pursue a career in science, technology, engineering, or math (STEM).[3] Those who placed into Geometry were more likely to enter college having passed high school Precalculus or Calculus with a C or better. Figure 6 shows that over half the Class of 2010 placed into Geometry, while 40% began with Algebra I.

Figure 6. Ninth Grade Math Course Placements for the Class of 2010 (n=97)*



***Data on 9th grade math course placement were only provided for 97 of 115 students who graduated in May 2010.**

High School Outcomes

SLA alumni—as well as current students, parents and staff—articulate a range of outcomes for students that go beyond test scores. In focus groups and interviews, members of the Class of 2010 spoke highly of the experiences at SLA. They told us:

- **SLA was a caring, accepting environment, and alumni reported becoming more tolerant and confident as a result.** Students used the words "family" and "community" to describe the atmosphere at SLA. Two students attributed this atmosphere, in part, to the small size of the school. Research supports the idea that small schools have advantages in creating a positive climate.[4]
- **SLA provided a challenging and engaging learning experience, and alumni reported developing critical thinking skills.** The graduates' perspectives stand in contrast to many small high schools that have been successful in creating a positive climate but have not been able to capitalize on this atmosphere to create a rigorous learning environment.[5]

[3] See Figure 1B in Appendix B.
[4] Cotton, K. (2001). New small learning communities; Findings from recent literature. Portland:Northwest Regional Educational Laboratory; Osterman, K.F. (2000). Students need for belonging in the school community. *Review of Educational Research*, 70(3), 323-367; Stewart, E.B. (2007). Individual and school structural affects on African American high school students academic achievement. *High School Journal*. Chapel Hill, NC: University of North Carolina Press.
[5] Stevens, W.B. (2008). *If small is not enough: the characteristics of successful small high schools in Chicago*. Chicago: Consortium on Chicago School Research.

- **SLA alumni seemed clear about their career path and described the independent and reflective learning experiences at SLA as helping them define a career path.** It was notable that all the alumni we spoke to had declared a college major and most seemed to have clear ideas about their career paths. This finding is particularly important because research has shown that having defined career aspirations and goals is positively related to both college persistence and job attainment.[6]

In addition to these impacts on students, the Class of 2010 showed some promising outcomes on more traditional measures of academic performance. For this analysis, RFA used District data for the 115 students identified as members of the SLA Class of 2010. In the figures that follow, an analysis of the attendance, 11th grade PSSA scores, grade point average (GPA), and course performance in science and math for the Class of 2010 suggests that many students excelled while at SLA, although with some mixed results.

Attendance

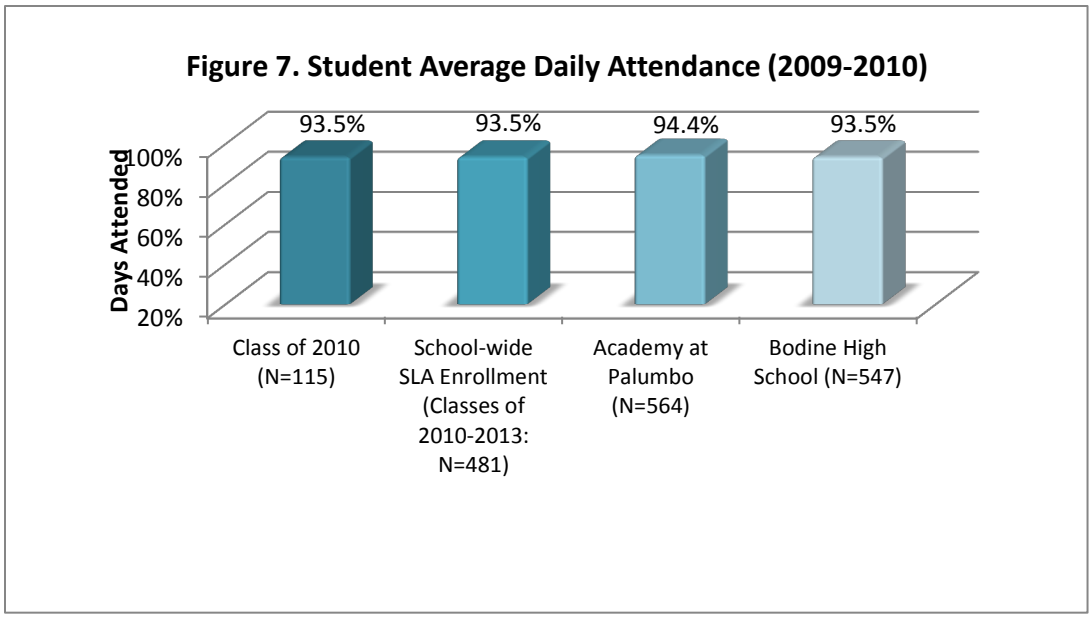
The attendance rate for the Class of 2010 mirrored the school-wide attendance rate of 93.5 for the 2009-2010 academic year.

The fact that even as seniors, the Class of 2010 was attending school at the same rate as the ninth, tenth, and eleventh graders suggests that SLA student engagement remained high through all four years. In interviews and focus groups, we heard repeatedly that SLA students enjoyed being at school.

The school wide attendance rate at SLA during the 2009-2010 academic year was similar to the school wide attendance rates at two other School District of Philadelphia small, special admission high schools (see Figure7).[7]

[6] Hull-Blanks et al., 2005; Schoon & Parsons, 2002

[7] Appendix A contains additional comparison data on these three small, special admission high schools. These schools were identified as peer schools based upon their common 2010 School Performance Index rankings as calculated by the School District of Philadelphia.



11th Grade PSSA Proficiency

The majority of the Class of 2010 scored proficient or above in reading and math in eleventh grade.

SLA's proficiency levels in both reading (83%) and math (64%) were higher than the Pennsylvania state averages (65% and 56% respectively).

More of the Class of 2010 scored proficient or above in reading (83%) than in math (64%).

When this cohort had last taken the PSSA in eighth grade, proficiency levels for math and reading were nearly equivalent to one another.[8] In comparison, a visible difference appears between the math and reading proficiency levels in eleventh grade, as shown in Figure I. Of the 36% who scored below proficient in math, the majority (70%) had placed into Algebra 1 as ninth graders. Those who placed into Geometry as eighth graders were more likely to score proficient or advanced. The decrease in proficiency since 8th grade, and the higher levels in reading than in math are consistent with both State (see Figure 8) and District (see Figure 9) performance trends.

[8] Figure 8 compares the PSSA reading and math proficiency levels for students in the SLA Class of 2010 who tested in both 8th and 11th grades (n=89). Although 114 11th graders took the PSSA in 2009, the School District of Philadelphia did not provide 8th grade PSSA data for over a fifth (n=25) of these students limiting the analysis to an "n" of 89.

Figure 8. PSSA 8th and 11th Grade Math and Reading Proficiency Levels for SLA Class of 2010 and Pennsylvania

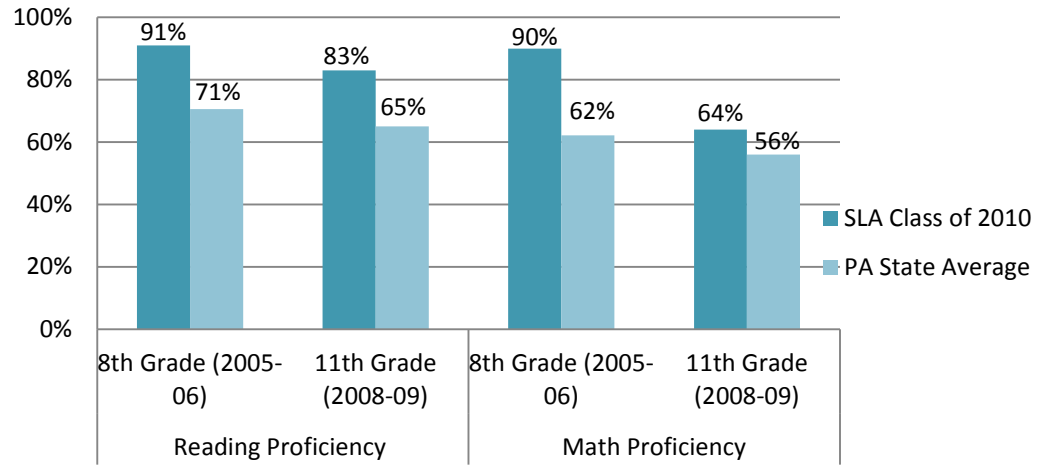


Figure 9. 11th Grade PSSA Math and Reading Proficiency Levels (2009), Across Three School District of Philadelphia Special Admission High Schools

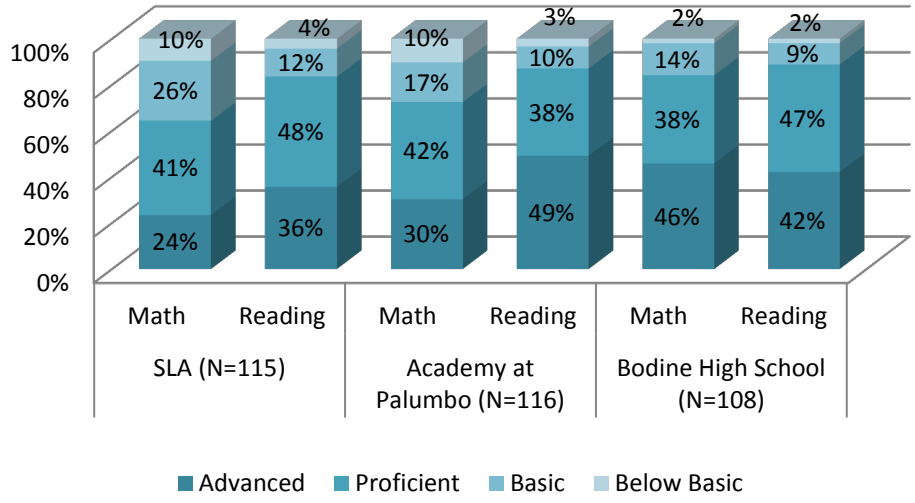
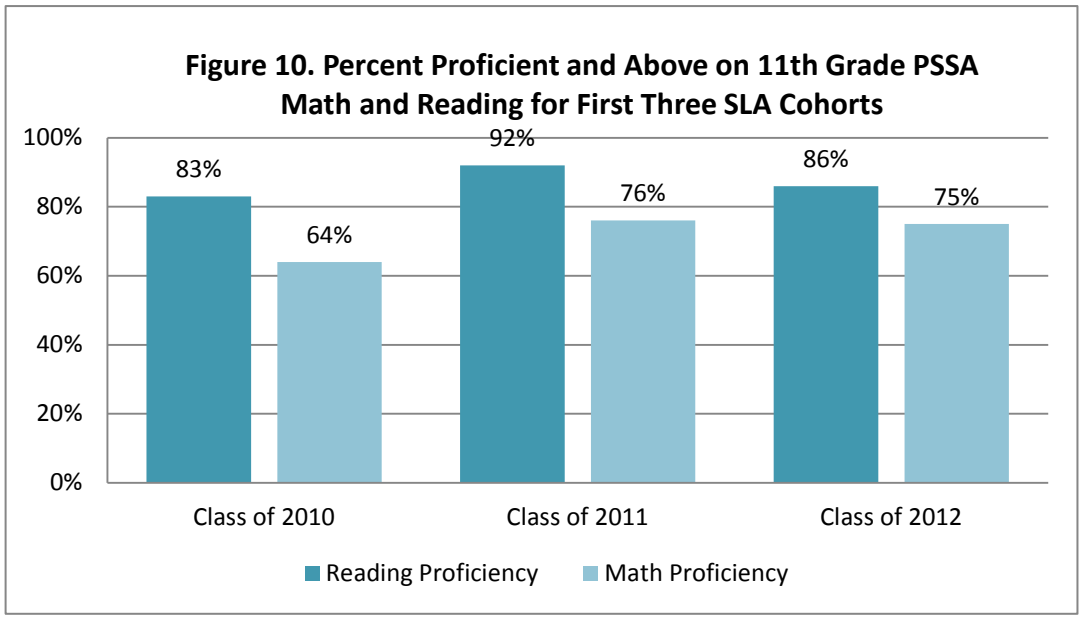


Figure 10 shows that this difference between math and reading has remained true in subsequent cohorts at SLA, but the size of the difference has lessened due to an increase in math proficiency.



Focus STEM PSSA Proficiency by Gender and Race

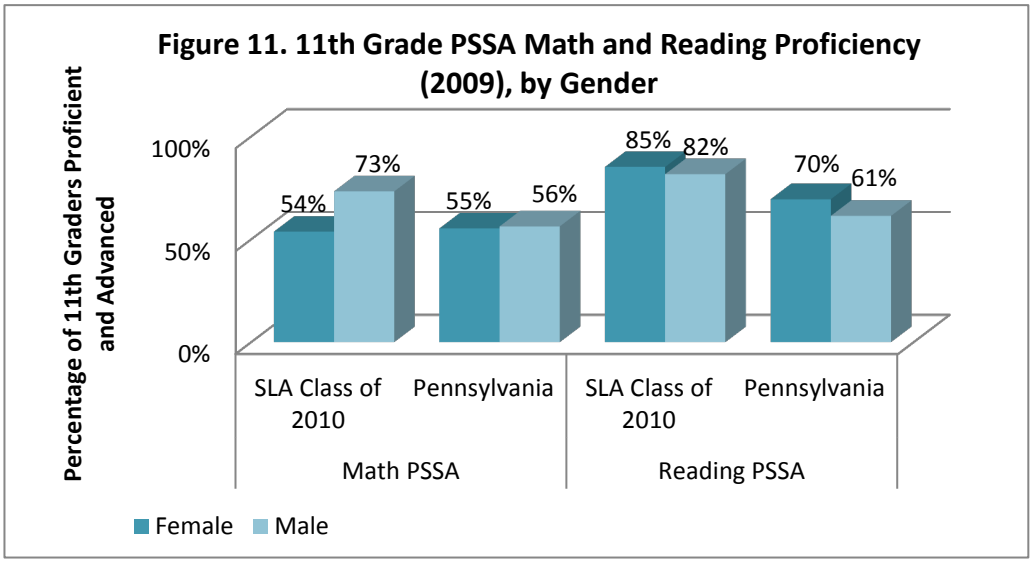
Figures L through N show the gender and racial breakdown of proficiency levels, revealing disparities. In particular, male students outperformed female students in both math and science proficiency and the majority of Black students failed to reach proficiency in math and science.[9] Further research is needed to explain the gender and race gaps that show up in SLA's math and science scores.

Gender Gap

In the Class of 2010, a significantly higher percentage of male students (73%) than female students (54%) scored proficient and above in math ($p<.05$).

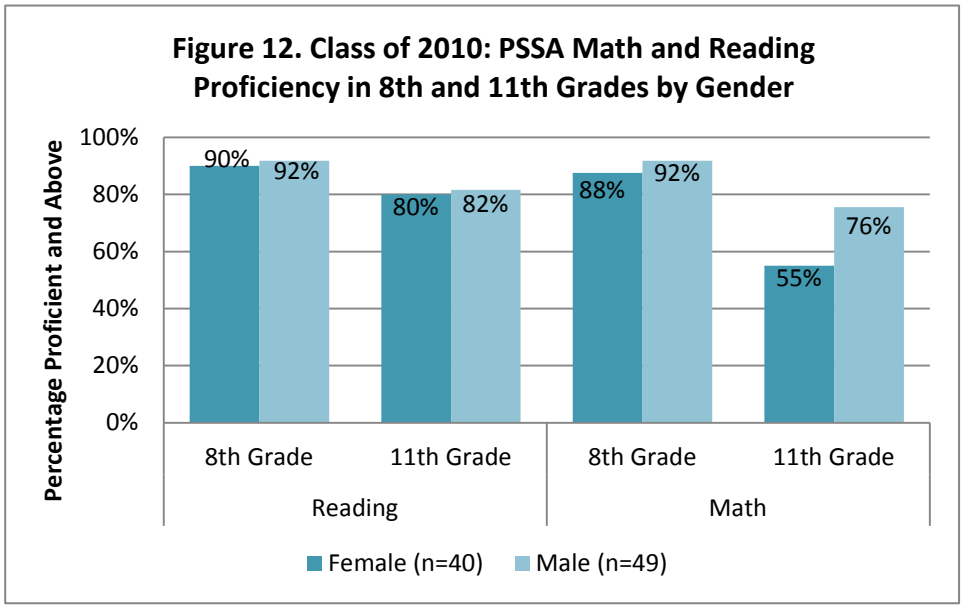
In comparison, Figure 11 shows that this gender gap in math proficiency did *not* exist at the state level, or at the other two School District of Philadelphia special admission high schools that also graduated their first cohorts in 2010.

[9] This confirms preliminary analyses of PSSA performance conducted by Frederic Bertley, Ph.D., Vice President, Science and Innovation, the Franklin Institute.



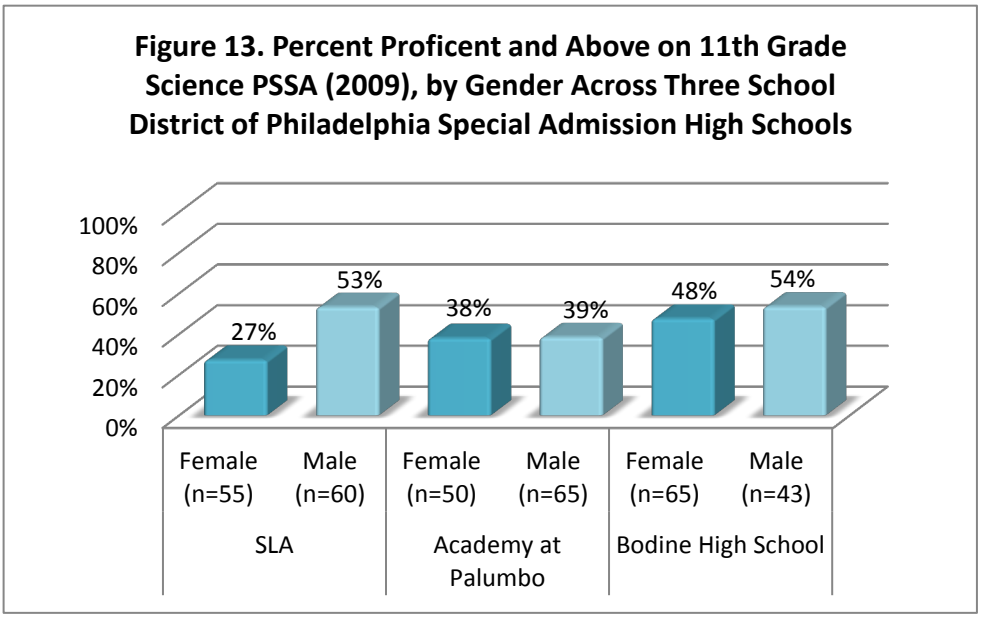
Girls and boys scored at similar math proficiency levels in 8th grade; the gender gap appeared in 11th grade.

Figure 12 shows that there was only a 4% gender gap in 8th grade math proficiency among the students who took the PSSA in both 8th and 11th grades. This gap grew to 21% in 11th grade. There was no gender difference in changes to students' reading proficiency from 8th to 11th grade.



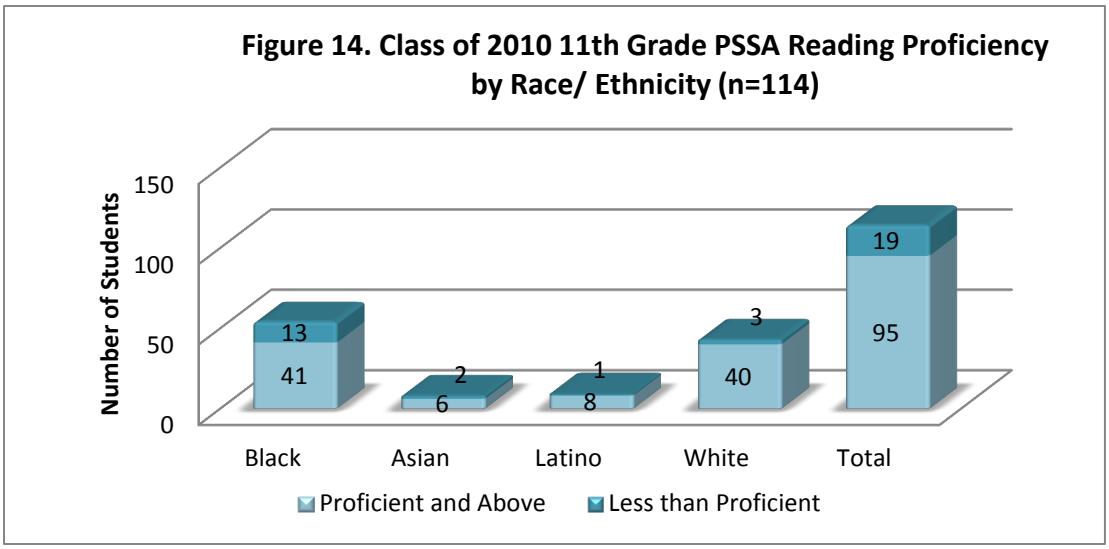
Just as in math, science proficiency was lower among female members of the SLA Class of 2010 than males (see Figure 13).

Figure 13 illustrates that the gender gap in the PSSA science proficiency of SLA's first graduating cohort was wider than in the Class of 2010 cohorts at two other similarly situated special admissions high schools.



Racial Gap

Reading: Figure 14 shows that *no* significant racial/ ethnic disparities existed in SLA Class of 2010 reading proficiency: All racial/ethnic groups were more likely than not to score proficient or above in reading.



Math: Slightly less than half of Black students in the Class of 2010 scored proficient and advanced in math. In contrast, all other racial/ethnic groups were more likely than not to score proficient or above, as evident in Figure 15.

Figure 15. Class of 2010 11th Grade PSSA Math Proficiency by Race/ Ethnicity (n=114)

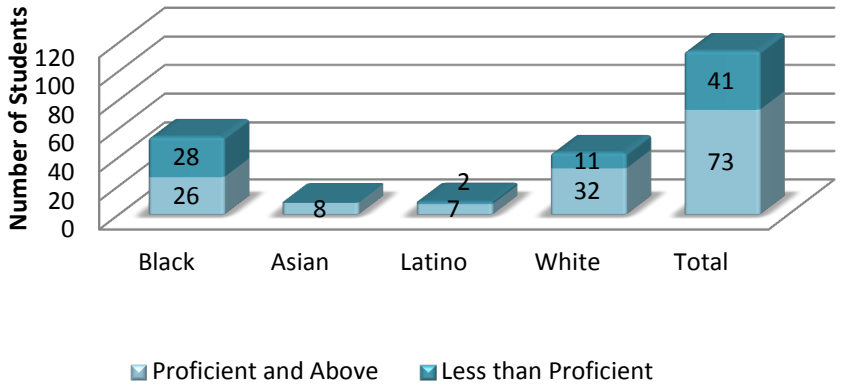
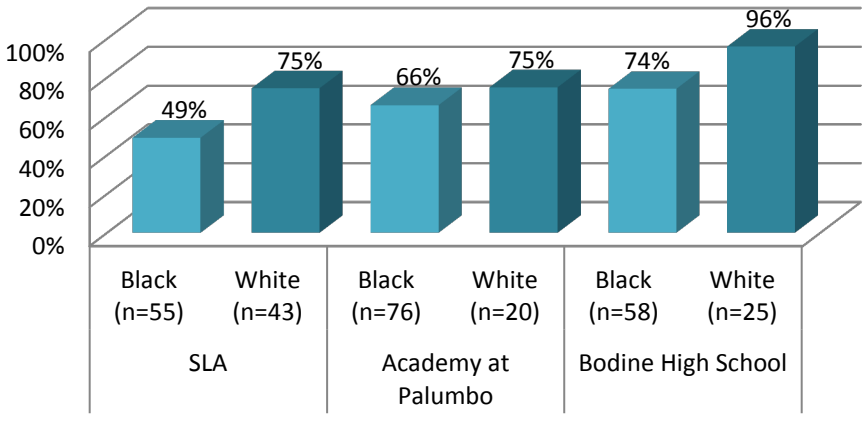


Figure 16 shows that a racial gap in math proficiency was also evident in the Class of 2010 cohorts at two similar School District of Philadelphia special admission high schools.

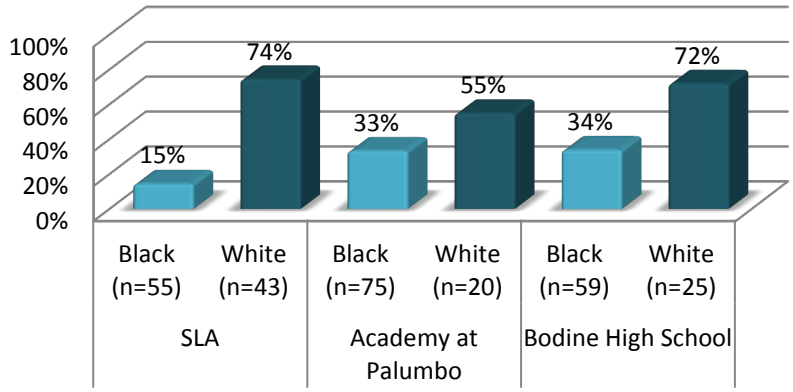
Figure 16. Percent Proficent and Above on 11th Grade Math PSSA (2009), by Race Across Three School District of Philadelphia Special Admission High Schools



The racial gap in the PSSA science proficiency of the SLA Class of 2010 was more pronounced than the racial gap in math proficiency: Only 15% of Black students scored proficient or above in science compared to 74% or their White peers.

Racial gaps in science proficiency were consistent across similar district schools. Figure 17 illustrates the considerable racial gaps in science proficiency among the Class of 2010 graduating cohorts of SLA, Palumbo and Bodine.

Figure 17. Percent Proficent and Above on 11th Grade Science PSSA (2009), by Race Across Three School District of Philadelphia Special Admission High Schools

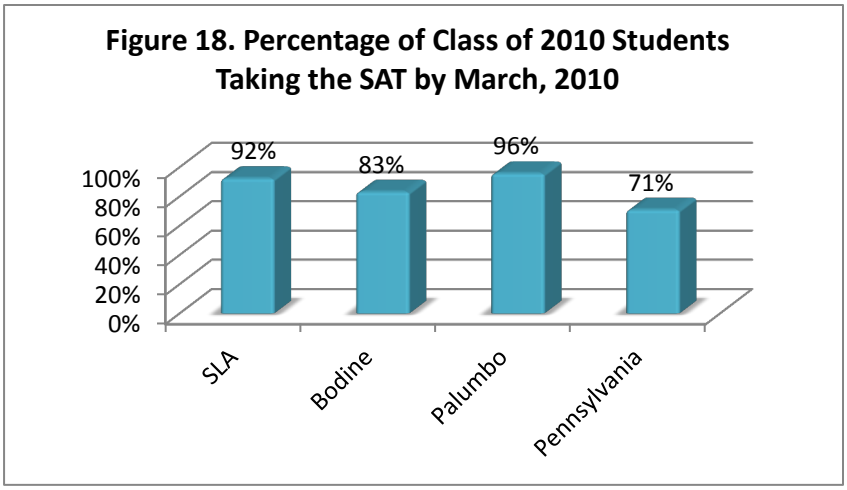


College Admissions Test Performance

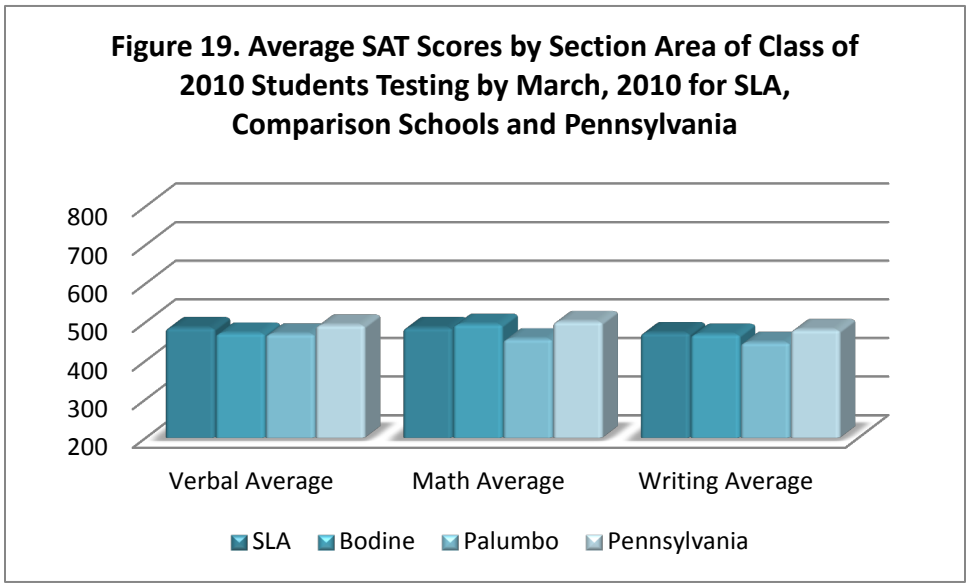
A very high percentage (92%) of the Class of 2010 had taken the SAT by March of 2010.

The SAT is a standardized test for college admissions in the United States. The high percentage of students taking the test indicates the presence of a strong college-going culture at SLA, even among the first graduating class. Figure 18 illustrates that the percentage of SLA's first graduating cohort took the SAT at a rate consistent with similar special admission schools and exceeded the statewide 12th grade testing rate.

Figure 18. Percentage of Class of 2010 Students Taking the SAT by March, 2010

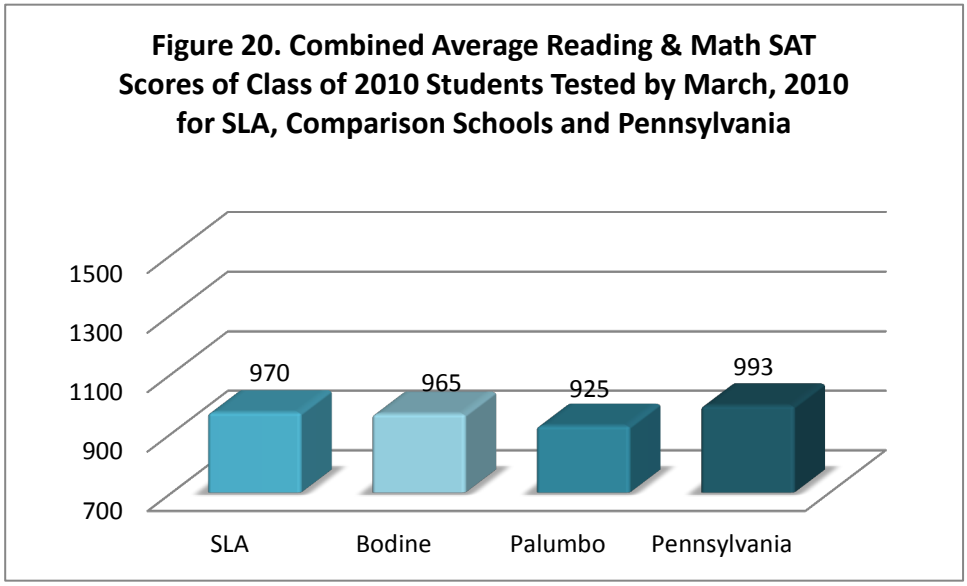


SLA's Class of 2010 performed consistently across all three sections of the SAT, and their average scores were similar to the average scores of the Class of 2010 cohorts of two other similarly situated Philadelphia special admission schools and across the state (see Figure 19). SLA's first set of average SAT scores are particularly strong considering the high percentage of students that took the test.



The SLA Class of 2010 averaged a higher combined math and verbal score compared to the Class of 2010 cohorts at the other two similarly situated special admission high schools. The strong showing by the Class of 2010 on the SAT is of particular interest because research has shown that pre-college preparation as measured by SAT results is highly correlated with students' persistence in STEM disciplines through college.[10] See Figure 20.

[10] Rask, 2010.



GPA and Course Performance

Overall, the Class of 2010 graduated with a cumulative GPA equivalent to a "B," with no gender difference and only slight variation across racial groups.

Table 2 displays the following:

- There was little variation in the average GPAs of male and female students.
- There were modest differences in the average GPAs of students across racial/ethnic categories:
  - Asian students had the highest average GPA (3.38);
  - Black students had the lowest average GPA (2.99).
- The Class of 2010 performed better in science courses than in math; overall, they averaged a "B" in science coursework and a "C" in math coursework.
- Science and math grade averages were similar for male and female students.
- The modest variation in science and math course grades across race/ethnic categories is consistent with variation in GPA; Asian students had the highest grade averages in both math and science and Black students had the lowest.

Table 2. Characteristics of the Class of 2010

Class of 2010: Average Cumulative GPA, Math Grade, and Science Grade by Gender and Race/Ethnicity			
	GPA	Math Grade Average	Science Grade Average
All Students (N=115)	3.11	78	83
Gender			
Male (n=60)	3.08	77	83
Female (n=55)	3.14	79	83
Race/ Ethnicity			
Black (n=55)	2.99	76	81
Latino (n=9)	3.09	77	82
Asian (n=8)	3.38	81	86
White (n=43)	3.21	80	84

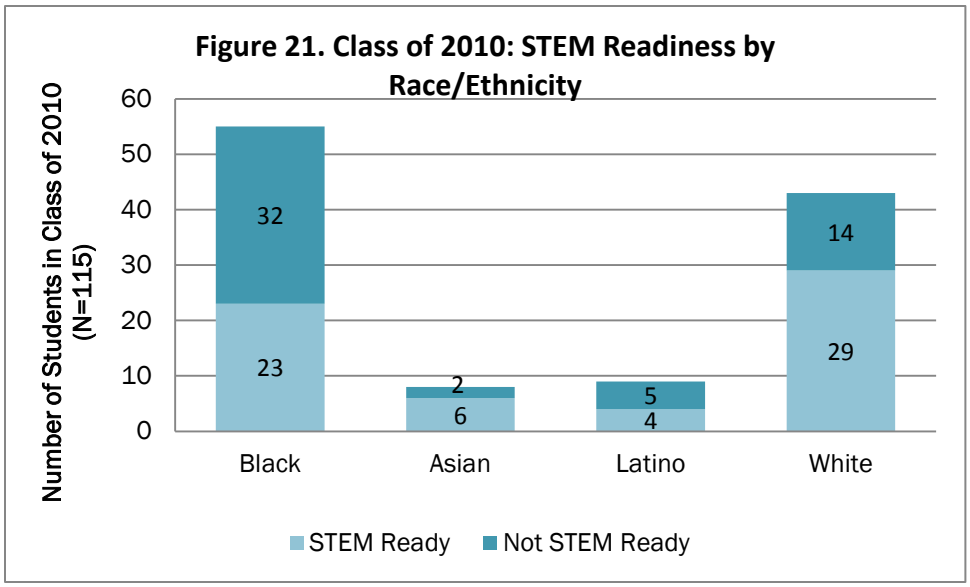
Preparedness for Science and Math Majors in College

To determine whether a student graduated from SLA prepared to succeed in STEM fields in college, RFA created a "STEM ready" measure. The completion of rigorous mathematics courses during high school is a consistent predictor of persistence to a postsecondary degree and a STEM degree in particular.[11] Moreover, college-level calculus is a prerequisite for most math and science majors in college, and thus it is critical that STEM interested students place into college-level calculus upon entry into college so as not to enter these programs already behind.[12] SLA graduates were categorized as "STEM ready" if they mastered precalculus sufficiently to be placed into college-level calculus on a math placement exam—having earned a C or better in precalculus or calculus prior to graduation from SLA. For more on the STEM-ready measure and correlations to other performance measures, see Appendix B.

Just over half (54%) of the Class of 2010 graduated STEM-ready, with no significant difference between genders.

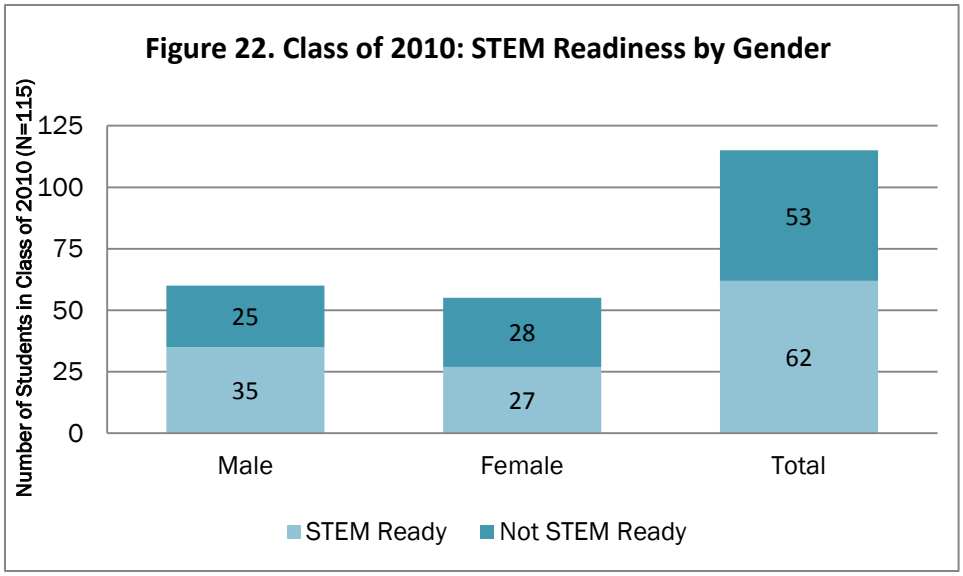
Figure 21 shows that 62 of 115 graduates were STEM-ready at graduation. Approximately 50% of females and 58% of males received at least a C in pre-calculus or calculus before graduating from SLA.

[11] Adelman, 2006.
[12] Rask, 2010; Shaw & Barbuti, 2010



STEM readiness varied across race/ethnic categories in the Class of 2010.

Figure 22 shows that while the majority of White and Asian students were STEM-ready at graduation, less than half of Black and Latino students were STEM-ready.



Transition to College

RFA examined the experiences of the Class of 2010 in their first year after graduation. Overall, 2010 graduates reported that SLA had prepared them for some aspects of college coursework better than others. In this section, we incorporate qualitative findings with a quantitative analysis of survey results[13] to describe how students fared in their first postsecondary year.

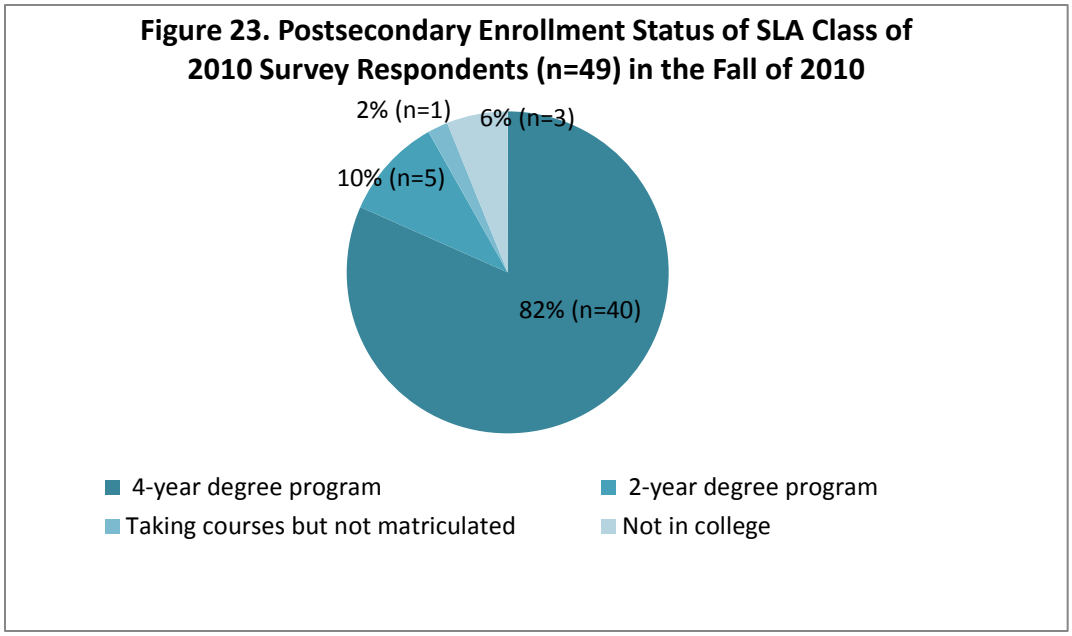
Postsecondary Enrollment

Nearly all of survey respondents (49 members of the Class of 2010) enrolled in college, and over half were first-generation college students.

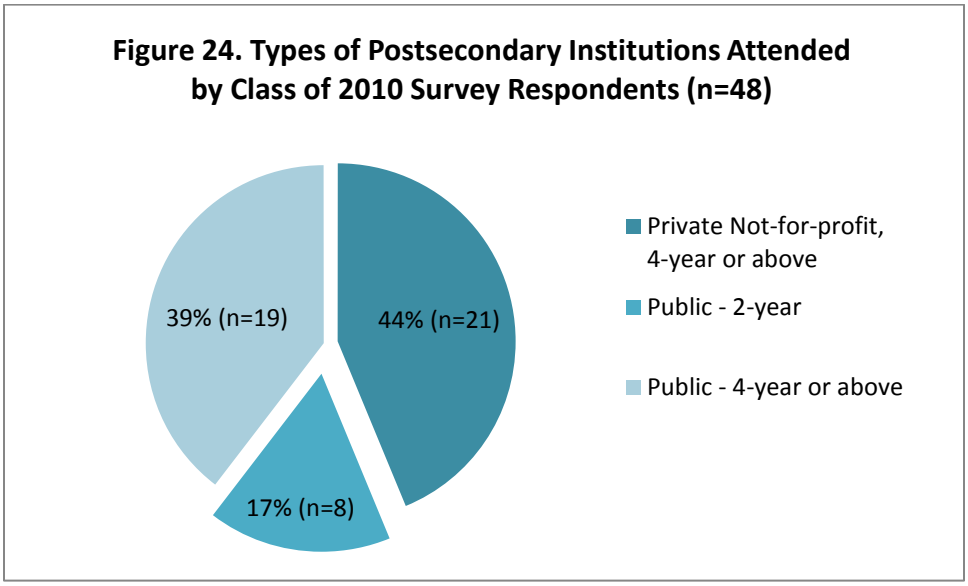
Since its founding, SLA has placed a strong emphasis on college going. Survey data show that 92% of respondents enrolled in a postsecondary degree program in the fall of 2010, and the vast majority (82%) enrolled in a four-year degree program (see Figure 23). This is significant because four-year postsecondary institutions have higher first to second year retention rates than two- year postsecondary institutions: 73% of first year students persist into their second year at four-year institutions compared to 56% persistence from year one to year two at two-year colleges.[14]

An additional five students (10%) reported that that they were enrolled in a two-year degree program. Two of the three respondents who were "not enrolled" in fall of 2010 reported that they had enrolled in college in the fall of 2011. In all, from fall semester of 2010 through fall semester of 2011 a total of 48 out of 49 respondents reported having been enrolled in college for at least one semester. Of these, 27 (56%) reported that they are first generation college-students.

[13] See Appendix for more details on the survey data presented in this section.
[14] ACT Institutional Data File, 2011



Students enrolled in four-year degree programs are divided between four-year public and private colleges and universities. All two-year degree students enrolled in public community colleges (see Figure 24).



Despite SLA's "small school" environment, most Class of 2010 respondents enrolled in medium or large colleges and universities.

Using the College Board's definition of college size, approximately 83% of respondents attended a college with more than 2000 students (medium or large).

Class of 2010 college enrollments also varied by the selectivity of the institution they attended.

A quarter of survey respondents went to schools that accepted less than half of all applicants in 2010. Half went to schools that accepted 50-75% of applicants, and another quarter went to schools that accepted more than 75% or had no admission criteria.

Survey respondents attended a wide range of postsecondary institutions in their first year—representing at least 26 different schools across 49 respondents.

The wide range and number of postsecondary insitutions attended by Class of 2010 respondents may be a reflection of the fact that SLA was still finding its way when assisting the first graduating class with the college application process. School leadership and staff said that they have learned important lessons about intentionally guiding students to schools that may better fit SLA graduates. "In that first year," said one, "it was like, let's just get them into college. Let's just send the paperwork. And now I think we are more targeted, and more intentional with what we want to accomplish." Research shows that peer support has a positive impact on adjustment to college[15], and especially for ethnic minority first generation college students.[16] Thus, directing students toward a few well-matched, four-year institutions with which a high school has strong relationships, can lead to better outcomes for students once in college.

Despite the variation across institutions, most SLA survey respondents (75%) were attending college in Pennsylvania.

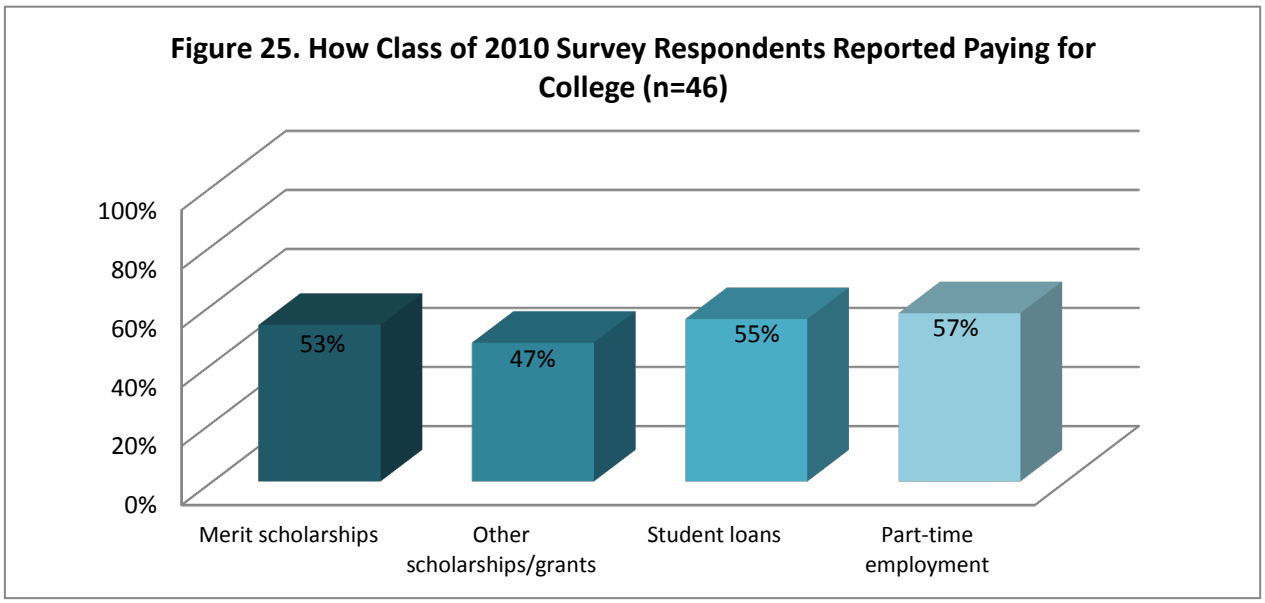
Paying for College

The financial challenges posed by the cost of higher education are of national concern. The experience of the Class of 2010 supports this picture.

The majority of college enrollees received financial aid.

Of the 46 survey respondents who enrolled in college in the fall of 2010, 80% (n=37) received some type of financial aid (scholarship/ loan) and 57% (n=26) were working while in school (see Figure 25).[17]

[15] Lotkowski et al., 2004
[16] Dennis et al., 2005
[17] The bars in this figure are not mutually exclusive and there is overlap in students across bars. For example, a student who paid for college using scholarship, loan, and a part-time job is included in the percentages for each of these three bars.



The percentage of SLA graduates working while enrolled in college is higher than the national average.

Over half (57%) of SLA survey respondents who entered college in the fall of 2010 reported working a job while enrolled compared to the national rate of 40.6% of full-time college students who were employed in 2009.[18] SLA graduates reported working a range of 5 to 30 hours per week, with an average of 17.16 hours per week. Research on the effects of working while in school suggests that working can have positive effects on students' academic[19] and social[20] college experiences, especially for students who work fewer than 20 hours per week. In contrast, students who work over 20 hours per week have less interactions with faculty, lower quality relationships with peers[21], and lower GPA's.[22] Even those who received financial aid were working—47% of them said they were employed—which suggests that the scholarships and loans they received were not sufficient to cover their college costs. It may also reflect the values of real-world work and entrepreneurship emphasized by SLA. A fuller understanding would require further investigation.

SLA staff said that the financial realities of college are going to pose constant challenges and they continue to learn how to guide students appropriately.

Answers, however, are not straightforward. One teacher pointed out that the most affordable institutions are often large and have pedagogical approaches far more traditional than what students experienced at SLA:

[18] Aud et al. (2011).
[19] King, 2002; Pascarella & Staver, 1985; Lundberg, 2004
[20] Orszag et al., 2001
[21] Lundberg (2004).
[22] Cheng, 2004

We are probably looking at some gap where the schools that kids can afford are the ones predominately with the large lecture formats, and where kids might get lost… The things that make SLA really meaningful for that kid, and provide stability, may not be as present in some of the places where kids have to go for financial reasons.

Perceptions of Academic Preparedness

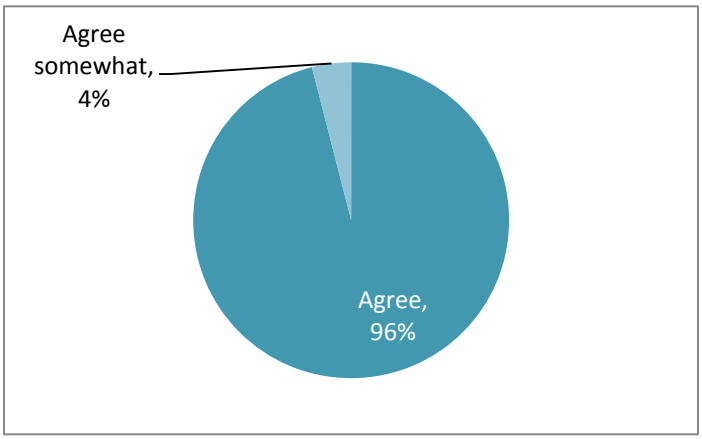
High Preparedness for Many Academic Practices

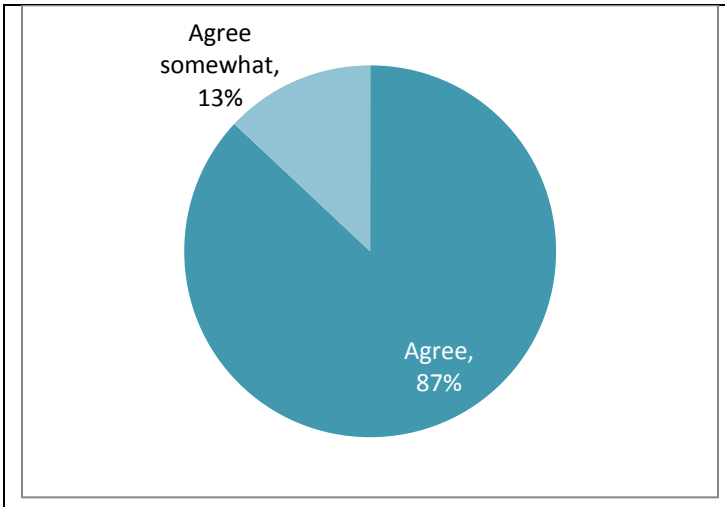
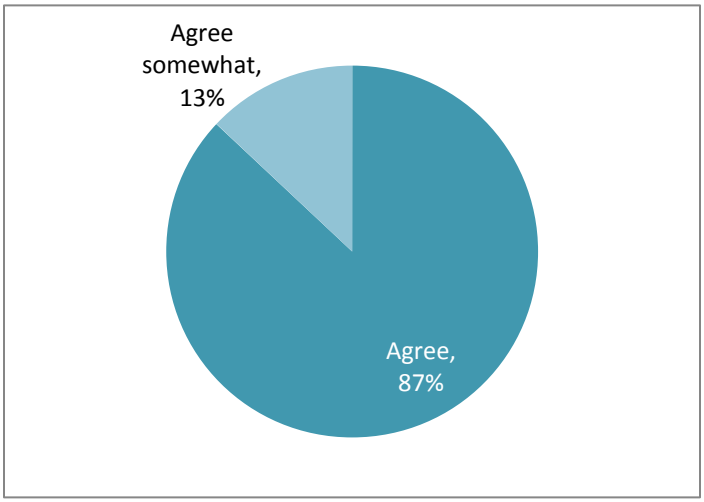
In focus groups and across survey responses, members of the Class of 2010 reported that they had obtained skills at SLA that served them well in college, often noting that they were better prepared for certain elements of college life than their peers.

The Class of 2010 reported that SLA had prepared them for (1) using technology, (2) relating across differences, and (3) participating in class discussions.

Table 3 shows the high level of agreement among survey respondents that SLA had prepared them in these three areas. None of the survey respondents disagreed or somewhat disagreed with these statements. Figure W also includes supporting quotations from members of the Class of 2010.

Table 3. Areas of High Preparedness

Survey Results (n=47 Class of 2010 respondents) SLA prepared me for . . .	Qualitative Comments from the Class of 2010
. . . Using technology to support my studies 	*Having gone to a school that focuses on technology and science I do feel more prepared than other students. A lot of people are intimidated by technology but I feel like as a result of going to SLA I feel like I know what role technology plays in my education and my life.* *Before SLA, I didn't really touch computers tht much at home, so this kind of got me interested in it, since it was an easier way to do a lot of things. And it definitely helped in college: going there and already knowing how to use a computer, whereas you have some people who probably never had one before, until they started college.*
. . . Relating to people who are different from me	*There is no definition of normal that you have to follow….And here I found friends who were just crazy and freakishly intelligent, and just actually downright inspiring…It's awesome, being with people that challenge you, but*

	*also respect the fact that you are who you are.* Students in two focus groups described increasing tolerance particularly in reference to lesbian, gay, bisexual, and transgender students. One student commented: *So I'm more accepting now, way more. Ninth grade, I probably was very uncomfortable.*
. . . Contributing to class discussions 	SLA encouraged inquiry and discussion, giving students the opportunity to develop arguments. One graduate wrote in on the survey, *Mostly [what helped in college was] SLA's emphasis on thinking for your own and not agreeing with things if I don't want to . I think being at SLA really helped me to become a critical thinker.* In college, however, many alumni found they had fewer opportunities for class discussion. One student said: *We don't get to fight about things in college. I took an ethics class, and we didn't get to argue about abortion. It was, like, he just wouldn't let us start on, like, fighting, discussing anything. He would just talk to us and go over definitions …. We didn't get to talk about it.* Another said about college professors: *They ask the questions. You don't get to question things. …. Here [at SLA] you're allowed to, I mean, you have to ask questions. They'd get mad at you if you didn't.*

The Class of 2010 also reported that the project-based approach at SLA developed (1) writing, (2) presentation, and (3) group-work skills that have been important in college.

These three skill areas came up frequently in focus group interviews. Figure X below provides detail.

Table 4. College Skill Learned Through Project-Based Learning

Skill	Finding	Quotes from the Class of 2010
Writing	Alumni in all three focus groups perceived themselves as having better writing skills than their college peers. They described completing papers easily and with less anxiety than their college classmates.	*When I started college, I met people who didn't know what a works cited page was. I'm so used to them, I didn't need the instructions the teachers gave us. So I like that they prepared us for stuff that we would use in college a lot.* *Yeah, in college, no one knew how to write papers. Like, they would all study and ace their exams but it was like a two-page essay, and they like had a panic attack*
Presenting	SLA graduates had had practice using Microsoft Powerpoint and giving presentations in high school, while peers in college, they said, tended to crowd slides with text and presented by reading directly from the Powerpoint.	*They just read off the Power point,* said one student of college peers*. An SLA teacher would just like, smack you. They'd be like, 'That is a paragraph on a slide.' They'd be like, 'No! Redo it, right now.'*
Group Work	Alumni said they were more prepared than their college peers for group work. They expressed frustration at the group projects they were asked to do in college because other students did not know how to work collaboratively.	*No one in college is understanding how to work as a team. They will split all the problem sets up, and each person does, like, two. The then, I don't know how to do the other six. And it's just that we could have gotten this done a lot more efficiently if we actually worked as a team.*

Limited Preparedness for Traditional Academic Settings

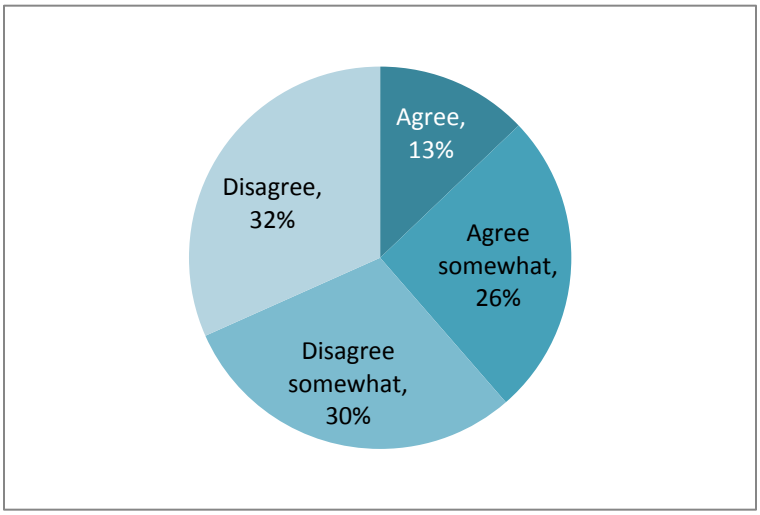
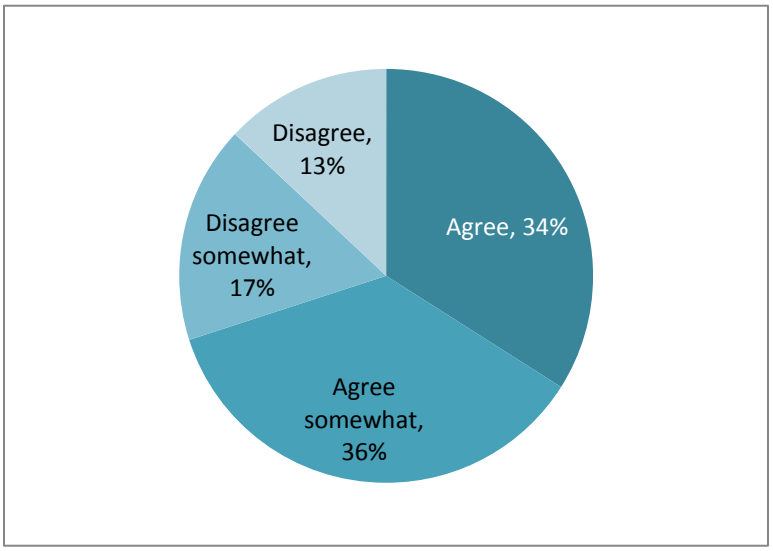
While members of the Class of 2010 said they excelled on papers and presentations in their first year of college, they also felt unprepared for some aspects of college where the pedagogy did not align with their SLA experience. They had to adjust to using textbooks, taking notes on lectures, and taking tests, particularly in science and math classes.[23] In comparison to the interactive class formats and positive relationships they had with teachers at SLA, students said the direct-instruction they encountered in college was less engaging, and the professors were less approachable.

The Class of 2010 reported that they were less prepared for (1) college lecture classes, (2) college tests, and to a lesser extent, (3) organizing class notes.

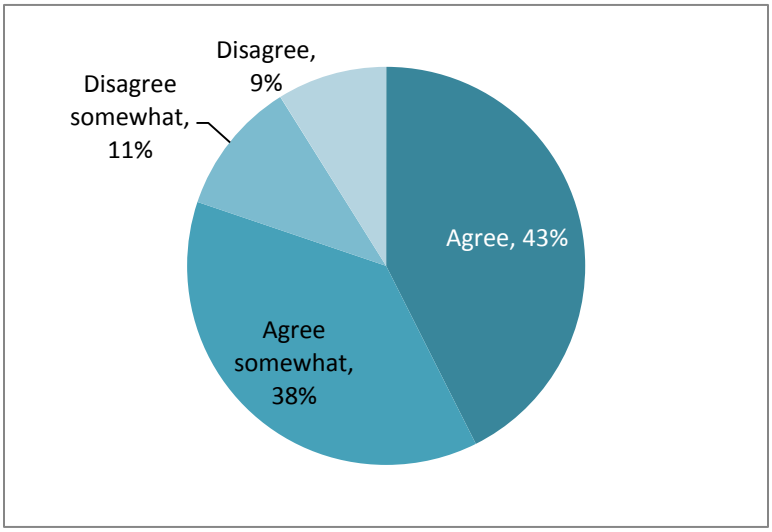
Figure Y shows that more students disagreed that SLA had prepared them for (1) college lecture classes, (2) college tests, and to a lesser extent, (3) organizing class notes.

[23] As we noted earlier in this brief, SLA has begun to integrate test-taking into the curriculum in more recent years in part because they understand students will likely encounter more traditional pedagogical approaches in college.

Table 5. Areas of Lower Preparedness

Survey Results (n=47 Class of 2010 respondents) SLA prepared me for . . .	Qualitative Comments from the Class of 2010
. . . College tests[24]  	*We are so used to doing our projects. Studying for finals was a whole new challenge to me.* *I like project-based learning because I cannot take a test to save my life. Every time I tak a test in college, it is not fun because I never do well.* *I haven't done any projects in college. I really miss projects like that. I am good with projects and bad with tests.*
. . . College lecture classes  	*And for some reason I decided [to take] Plagues and Pandemics….In SLA science classes, we'd actually do things like, 'Hey, we're going to take apart a skeleton and look at these things.' In this class it was like, 'I'm going to talk at you for two hours and that's it.'* *I understand that the classes are moving forward, and there may have been 60 kids in my Calc class, but still, I feel like we're not learning very well if it's kind of, shovel the information in your head, make sure you know it for the exam, spill it out, and then move on to the next class.*

[24] In addition, students wrote in on the survey that SLA could have better prepared them for college by teaching studying and/or test-taking (25 out of 37 written responses). A number of those responses were nuanced with recognition that more focus on test-taking would have changed the environment at SLA.

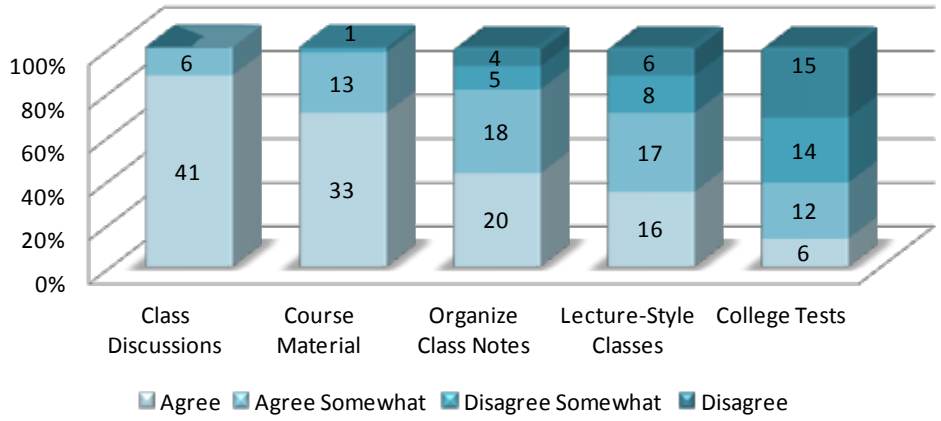
. . . Organizing class notes  	*[SLA could have better prepared me with] study skills, like how to take good notes and how to read textbooks and comprehend the information better.* *The only thing that I really struggled with was getting into the gist of getting ready for various midterms and finals in the semester.*

Interview participants from the Class of 2010 were discouraged by freshmen-level science courses, largely because of a different teaching approach than they were accustomed to at SLA.

Students in two focus groups said that their college science courses were hard. In a few cases, students expressed that the challenge was related to not knowing material that would have helped them understand the course content. Overall, however, students reported being prepared for content in all subjects in college. As evident in Figure 26, all but one of the Class of 2010 survey respondents (98%) agreed or strongly agreed that they were prepared for understanding

college course material.

Figure 26. SLA Class of 2010 Survey Respondents (n=47): Perceptions of Preparedness Across Five Components of College Courses



More focus group participants said science courses were challenging not because of the content but because of the very different teaching approach they encountered in college compared to SLA's approach. Instead of learning science through inquiry-based and project-based pedagogy, alumni said college professors handed out notes and/or read off Powerpoint slides. The contrast between SLA classes and the teacher-focused lecture classes students experienced in college is evident in students' survey responses as well. As shown in Figure 27, Class of 2010 respondents showed high levels of agreement about being prepared for college course content and class discussion, but nearly a third *disagreed* about being prepared for lecture style classes. The students said that the teacher focused classroom was less engaging and diminished their interest. One said:

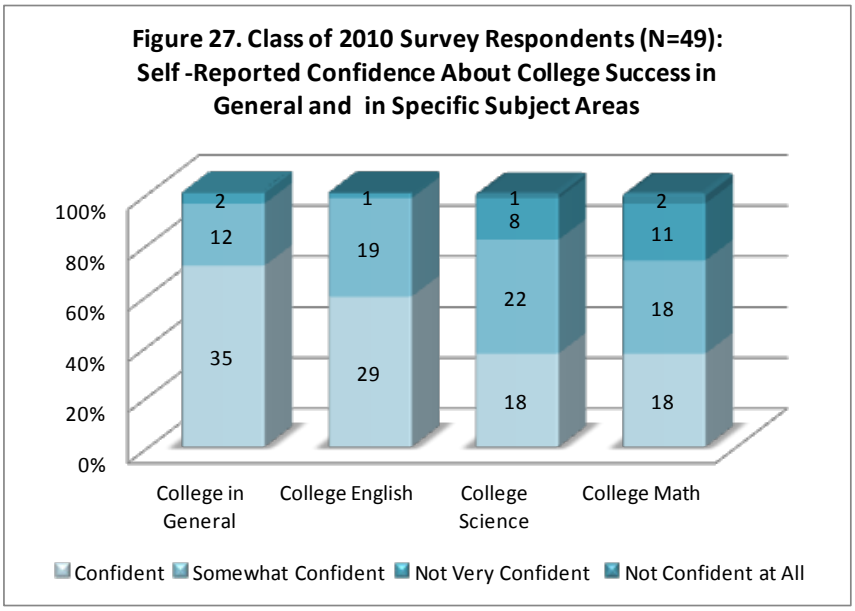
> *Like science and engineering. And from my time here [at SLA] my interest in science and engineering and math never waned at all. It always increased. To be honest, now that I am going to college, I am finding myself less interested. … I feel in college perhaps it'll be foundation classes that you have to take, but they really make it difficult and not interesting at all.*

Survey results suggest students were more confident that they would do well in their English courses than in their science and math courses.

Figure 27 shows that, overall, the majority of respondents were either confident or somewhat confident that they could succeed in their college courses.

They were somewhat less likely to express confidence in their ability to succeed in math and science than in English. The confidence in English and the humanities was echoed in focus groups where one alumnus said, "English 101 was like ninth grade!" Another stated:

There are some classes where I definitely feel like it was easier [in college] than at SLA…. I've been saying this: I repeated my 10th grade year of history and English in my first year of college. Everything that I was taught then, my first year was really based on.



Elements of the SLA Model and College Preparedness

Among the elements of the SLA model that the Class of 2010 found <u>most</u> helpful in college were (1) access to technology- individual laptops, (2) internships through the Individualized Learning Plans (ILPs), and (3) the inquiry-based curriculum.

The survey results reported in Figure 28 echo the findings reported above: SLA graduates felt well-prepared for college in terms of technology and project skills (e.g. writing, presenting, and group work). The additional finding that students valued their internship experiences is important for two reasons:

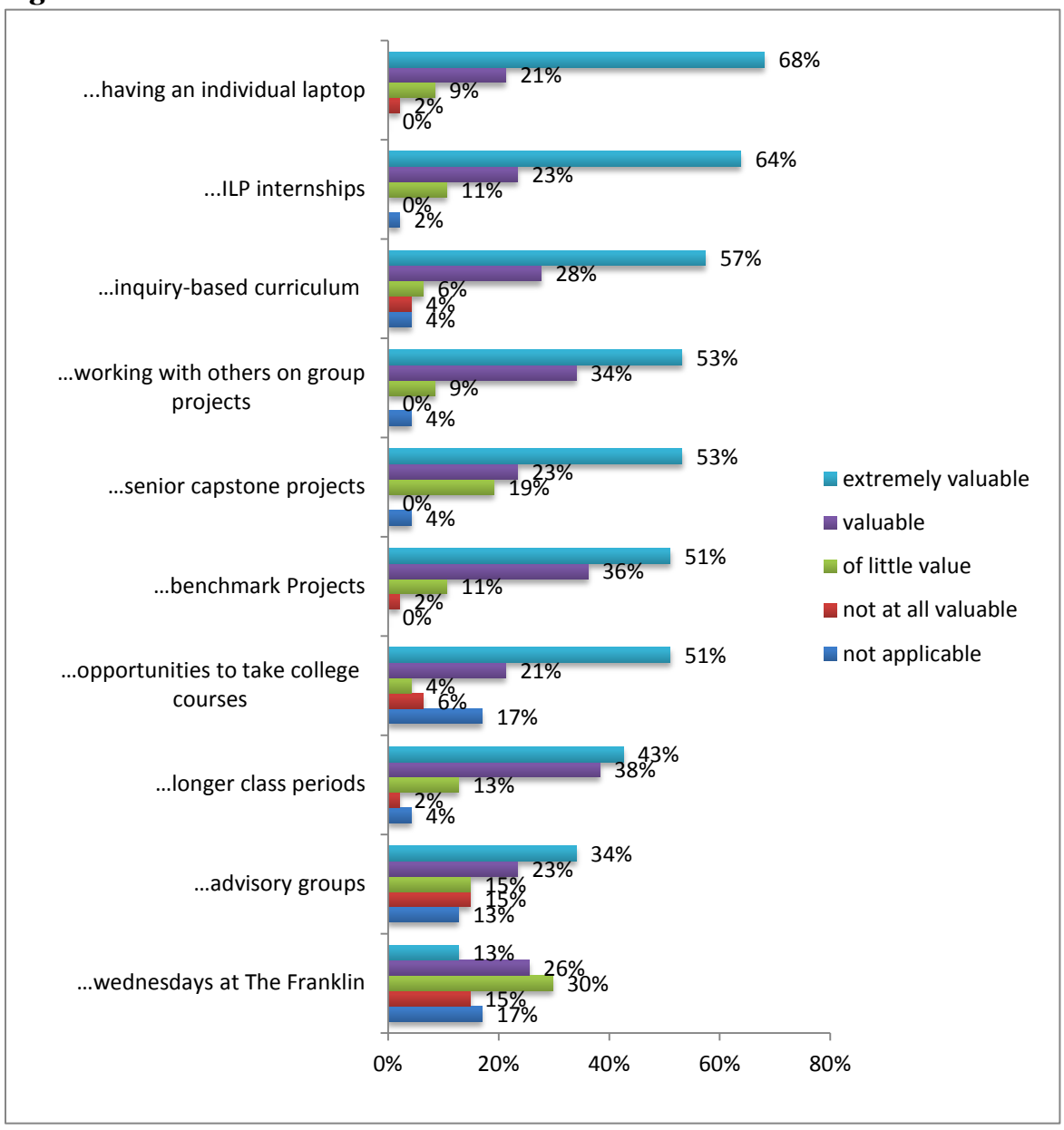
- The ILP program, which SLA implements in students' sophomore and junior years, is a manifestation experiential education, an important foundation for the SLA model. As one parent said, "This is real life. I can't remember who said it. 'High school shouldn't be preparing you for life, it should be life.'"

- In focus groups, alumni told us that SLA helped them choose their majors and/or career directions, and that the ILPs were formative in this process, sometimes by clarifying for students what student did *not* want to pursue.

Figure 28 shows the range of responses to a survey question that asked respondents to rate the value that individual elements of the SLA model had in preparing them for college. The majority

of alumni respondents ranked most SLA model elements as either extremely valuable or valuable.[25]

Figure 28. Elements of the SLA Model



Early College Outcomes

Three milestones related to college success were tracked to provide preliminary insight into how SLA functioned during its first four years to prepare students for success in college in general and STEM in particular. These three milestones, or early college outcomes, are first-year to second-year persistence, course passage and GPA, and persistence in STEM majors. Our

[25] The only exception was "Wednesdays at the Franklin," however, nearly 20% of respondents chose not to rate the value of this element and answered "not applicable."

assessment of these early college outcomes are based on the survey responses of 49 alumni from the Class of 2010 who completed an online survey in November and December 2011. Please note, the following outcomes are limited to the self-reported outcomes of Class of 2010 graduates who responded to the survey (about 42% of the class).

Persistence in College: Year One to Year Two

SLA Class of 2010 respondents who enrolled in college in fall of 2010 (n=46) reported a high rate of persistence into their second year of college.

As of December 2011, a total of 42 out of 46 respondents, or 91%, reported that they were still enrolled in college. This persistence rate is well above the national first to second-year persistence rates for students enrolled at both two-year (57% persistence) and four-year (73% persistence) postsecondary institutions.[26] The majority of those persisting in college, 83% (38 out of 42 respondents), had continued to be enrolled at the same school uninterrupted from fall 2010 through the fall semester of 2011, while four had transferred to another school but remained enrolled in college.

The high level of reported persistence by SLA alumni is consistent with research that has found a strong positive association between completion of rigorous high school academic curricula, as are required at SLA, and persistence to a bachelor's degree.[27]

Academic Progress and GPA

The vast majority (89%) of respondents who were enrolled in college during the 2010-2011 academic year indicated that they had passed all of their completed courses. Moreover, 67% of survey respondents who enrolled in fall of 2010 reported cumulative college GPAs between 2.50 and 3.49 (a B average) for the 2010-2011 academic year.

Not only were SLA survey respondents persisting in college at high rates but they were also successfully completing their courses. The course completion and GPA outcomes reported by SLA survey respondents are consistent with their positive perceptions of being prepared for college and their high level of confidence about succeeding in college described in this report.

Persistence in STEM

In the fall of 2011, 32% (n=15) of the 46 SLA alumni respondents who first enrolled in college in fall of 2010[28] reported that they either had declared or planned to declare a STEM major.

These alumni respondents who were still pursuing a STEM degree in the fall of 2011 (n=15) were significantly more likely to take calculus in their first year of college than respondents who were not interested in a STEM major (p<.05). This

[26] National collegiate retention and persistence to degree rates are published annually by ACT, Inc. and can be found on their website at http://www.act.org/research/policymakers/pdf/retain_2011.pdf
[27] Adelman, 2006; Horn & Carroll, 2001
[28] Persistence in STEM was calculated using data about declared major and intended major. Of the 46 respondents who enrolled in college in fall 2010, 36 reported that they had formally declared a major and 10 provided an intended major.

finding highlights the importance of tracking STEM-readiness as a critical high school outcome for students interested in pursuing STEM majors. The majority of SLA alumni who persisted in STEM through their first three semesters of college had successfully completed calculus in their first year, which was possible because they entered college prepared for college-level calculus.

73% of respondents who enrolled in college in the fall of 2010 and who reported that they were pursuing STEM majors had completed 2 or more math courses prior to the start of their second year of college in fall of 2011. Likewise 73% of these STEM degree-seeking respondents had completed 2 or more science courses by the fall of 2011.

These findings regarding math and science course taking in college are particularly encouraging because research shows that the longer students wait to take their first STEM course the less likely they are to take a second and persist in STEM fields. This research suggests that STEM-focused SLA alumni respondents who have already completed at least two math courses and/ or two science courses before their third semester in college have an increased likelihood of persistence in a STEM major through future semesters.[29]

During the fall 2011 semester, 87% of STEM degree seekers reported that they were currently enrolled in a math course, and 73% reported that they were taking a science course.

73% of linked respondents[30] who reported that they were pursuing a STEM major in college were STEM-ready at graduation from SLA.

This finding is consistent with recent research on persistence to degree in STEM fields, which has found that strong pre-collegiate preparation in math is a positive indicator of early postsecondary persistence in STEM.[31]

There is national concern over the small number of U.S. college graduates entering STEM fields, and increased emphasis is being placed on high quality high school preparation in math and science and pre-collegiate exposure to STEM fields. Although the findings presented in this section are based on survey responses from a subset of SLA's first graduating cohort, the results around STEM persistence are promising and suggest that SLA is providing the pre-collegiate preparation that STEM-focused students need to successfully pursue postsecondary degrees in STEM fields.

Conclusion and Recommendations

This research brief has provided a close look at important successes and challenges of the first graduating class of Philadelphia's Science Leadership Academy. Aspects of SLA's educational model, including the school's partnership with The Franklin Institute, were still evolving during the school's first four years, when the Class of 2010 walked its hallways. Modifications to the

[29] Rask, 2010
[30] "Linked respondents" refers to the subset of 34 out of 49 survey respondents who provided identifying information that allowed for their survey data to be linked with their high school data provided by the School District of Philadelphia. More information on the sample of linked respondents can be found in Appendix A.
[31] Rask, 2010

model include: (1) greater selectivity in the admissions process; (2) addition of standards-based assessments in science and math courses; (3) addition of mini-courses at TFI and a new liaison to improve the TFI-SLA partnership; (4) expanded options for ILPs and Capstones projects; and (5) improved college application supports.

While SLA has seen changes since its first cohort passed through, the school's overarching vision and commitment to inquiry-driven, project-based, and experiential learning have remained the same, and the experiences of the Class of 2010 have lessons to teach.

As reported here, Class of 2010 outcomes in high school and early college point to several notable successes:

High School Experience

- Overall, alumni from the Class of 2010 had **very positive experiences** during their four years at SLA and expressed a strong fondness for the school.
- **High attendance rates** through senior year suggest that SLA was engaging and welcoming to students.

High School Academic Outcomes

- The majority of the Class of 2010 scored proficient or above on the **11th grade PSSA** in reading and math, at rates higher than the state average.
- A very high percentage of the Class of 2010 **took the SAT**, and performed relatively well in math, verbal, and writing portions when compared with similar District schools.
    - Just over half of the Class of 2010 graduated **ready for STEM fields in college**, with no significant difference between genders.

College Enrollment

- Results of an alumni survey show that nearly all alumni respondents **enrolled in college**, and over half were first-generation college students.

College Preparedness

- The Class of 2010 reported that SLA had prepared them for (1) using **technology**, (2) relating **across differences**, and (3) participating in **class discussions**.
- The Class of 2010 also reported that the **project-based approach** at SLA developed (1) writing, (2) presentation, and (3) group-work skills that have been important in college.

However, analyses of the Class of 2010 outcomes also reveal several points of concern. Table 5 outlines findings of concern and related recommendations.

Table 5. Concerns and Recommendations

Finding of Concern	Recommendation
In both math and science proficiency on the PSSA, Black students and females fared worse than their counterparts. Similarly, Blacks and Latinos were less likely than other racial groups to graduate from SLA prepared for STEM fields in college.	Further research is needed to identify the factors that are contributing to the gender and racial gaps in math and science test scores and racial gaps in STEM readiness. Analyses of multiple cohorts that include more complete data on students' pre-high school preparation and performance would allow us to explain the variance in performance across subgroups. Interviews or focus groups with these students will allow us to explore the findings of these analyses with students; and to gain their insights and recommendations for how to address enduring challenges.
The Class of 2010 reported that they were less prepared for (1) college lecture classes, (2) college tests, and to a lesser extent, (3) organizing class notes.	The addition of standards-based assessments appears to be a good step towards preparing students for test-taking in college. Additionally, developing admissions agreements/ partnerships with four-year colleges and universities that have incorporated project based learning into their curricula, and particularly their freshman year STEM curricula, would provide more consistency in classroom pedagogy and learning styles from SLA to college.[32]
Survey respondents attended a wide range of postsecondary institutions in their first year—representing at least 26 different schools across 49 respondents.	Research has shown that peer support has a positive impact on college adjustment and success as well as persistence in STEM majors.[33]Directing students toward fewer, well-matched, four-year institutions with which SLA has strong relationships, can lead to better outcomes for students once in college.
The percentage of SLA graduates working while enrolled in college was higher than the national average.	SLA would do well to continue its focus on improving guidance to students and families with regard to financial aid and scholarship options. Further research is needed to determine reasons for the high levels of employment among SLA graduates who are simultaneously enrolled in college.

The research on college outcomes presented in this report is preliminary and continued research is needed to track the degree attainment of SLA graduates. In addition, current findings are limited because they are solely based on the self-reports of a sample of graduates from the Class of 2010. Future research that combines student survey data with enrollment and persistence data provided by the National Student Clearinghouse would provide more conclusive findings on students' college success.

[32] A recent *New York Times* article (Drew, 2011) documents several college and universities which are making efforts to address STEM attrition by making project-based and experiential classes available to first year students.
[33] Lotkowski et al., 2004; Perna et al., 2009

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Appendix A: Methodology

Qualitative Methods

Focus groups and interviews were conducted with a total of 62 individuals connected with SLA. Interviews were conducted between the June-November of 2011. SLA teachers, students and parents were identified for interviews with the assistance of SLA. Table 1A displays the characteristics of interview participants.

Table 1A. Interviews

Position	Number
SLA Alumni	12
SLA Faculty & Staff (Principal, Counselor, STEM & Non-STEM teachers)	18
Parents of current SLA seniors	6
Current SLA seniors	15
TFI Staff (VP, Manager, Liaison)	3
TFI Mini-Course Instructors and ILP Supervisors	8
Total	**62**

Alumni interviews were conducted in the spring of 2011 and analysis of these interviews informed the development of interview and focus group protocols for fall data collection. They also informed the development of a coding scheme. All interviews were recorded and transcribed and entered into Atlas ti., a qualitative data management system. Themes were identified across interviews and with reference to the research questions and used to develop a coding scheme which included six code families (See Table 2A). Analytic memos were drafted based on code families and used to identify findings.

Table 2A. Coding

Code Family	Codes
TFI Partnership	Partnership goals Partnership activities & staffing Communication/Collaboration Challenges in partnership Benefits of partnership
Leadership & Staffing	Principal leadership/role Teachers & teacher leadership Teacher support & evaluation
Elements of Instructional Model	Advisories Technology PBL &Inquiry-based learning Curriculum Planning & Assessment EduCon ILPs Capstones STEM classes/experiences
School Climate	Caring environment Student Voice Physical appearance Messages Parent/Community
Post-Secondary prep and experiences	College Transition Supports Career/college plans Accessibility of professors Group work and communication Humanities Math Science Teacher-centered instruction Test-taking Using technology Using textbooks Writing Other student outcomes
Other	Additional resources/fundraising Admissions process HS Transition Class of 2010

Quantitative Methods

Analysis of School District of Philadelphia Class of 2010 Student Records and School-Level Data

Student Record Data: The population for the analyses described included the SLA graduating class of 2010 for which we received Science and Math Course, PSSA, and Demographics files that contained 115 unique IDs from the School District of Philadelphia. After thoroughly documenting the contents of these files, the Science and Math data file included any possible classes the students have taken over four years (2006-07 →2009-10) in both of these subjects, along with their course marks and the academic year each class was taken. Additionally, the PSSA data files provided the Math and Reading scores available for each student in the SLA Class of 2010 (when available) for 8th grade (2006 PSSA) and 11th grade (2009 PSSA). The Demographics data file provided further information about the students' backgrounds for the 2009-2010 school year.

School-Level Data: State and school-level data (i.e. student enrollment, attendance rates, School Performance Index rankings as well as SAT and PSSA results) that are reported in this brief were retrieved from publicly available data published on the School District of Philadelphia and Pennsylvania Department of Education (PDE) websites.

Within-District Comparison School Selection

Two small special admissions high schools, the Academy at Palumbo and Bodine High School for International Affairs) were selected as comparison schools for showing how SLA Class of 2010 students performed compared to their peers enrolled in similar schools. Although they have different focus areas (SLA focuses on STEM, Bodine focuses on international affairs and offers the International Baccalaureate (IB) degree program, and Academy at Palumbo has a more general focus, offering curricula and programs that address students' academic, cultural, social and athletic needs), they are appropriate for making within-district comparisons due to the similarities in their admissions type, size, SPI for 2010, and other school characteristics (see Table 3A below).

Table 3A. Comparison of Three SDP Special Admissions High Schools Graduating First Class in Spring 2010 (data from school year 2009-10)

	Science Leadership Academy	Bodine	Academy at Palumbo
Enrollment	485	533	494
Percentage of low income students	49%	61%	61%
Percentage of special education students	5%	5%	1%
Percentage of ELL students	2%	2%	2%
Average teacher daily attendance	97%	93%	98%
Out-of school suspensions per 100 students	1	12	1
School District of Philadelphia School Performance Index (SPI) Rating (2010)	2	2	2

Analysis of Class of 2010 Survey Data

SLA provided an email list with 112 unduplicated names and email addresses on it. We used this list to send email invitations to participate in our survey from SNAP Surveys. SLA also sent invitations through Facebook and their mailing list. We received attendance roll sheets from SLA for the week of January 10, 2010 with 118 students included in the Class of 2010. The roll sheets were used as the master list since all students were contacted in some manner.

We received 53 responses to our survey. Three of the cases were determined to be duplicates based on name and/or college attendance and work information. The most complete record was kept. A fourth student was dropped due to lack of graduation information. Analyses in this report are based on the 49 non-duplicated responses, a response rate of 41.5%.

The survey was anonymous, but students had an option to identify themselves and be entered in a drawing to receive a $50 iTunes gift card. Identifying information was used in our analyses to link survey data to school district data.

Survey Respondents compared to population

70% of our sample (N =34) chose to identify themselves. Table 4A shows how these matched respondents compared to the Class of 2010 as a whole. An equal number of males and females identified themselves, which was similar to the Class of 2010 (N=115 in 12th grade). Respondents who chose to identify themselves were somewhat more likely to be White than the Class of 2010 as a whole. Academically, the sample of matched respondents appears to be somewhat higher achieving than the Class of 2010 as a whole: matched respondents were more likely to have a cumulative high school GPA equivalent to an A (47% of matched respondents compared to 37% of the Class of 2010) and less likely to have a cumulative GPA equivalent to a C.

Table 4A. Comparison of SLA Survey Respondents and Complete Class of 2010 Cohort on Select Background Characteristics

	Class of 2010 Survey Respondents (n=34)	Class of 2010 (N=115)
Gender		
Female	50%	48%
Male	50%	52%
Race/Ethnicity		
Black	35%	48%
White	53%	37%
Asian	6%	7%
Latino	6%	8%
Average Grade		
A	47%	37%
B	41%	42%
C	12%	22%
11th Grade PSSA Proficient and Above		
Reading	79%	83%
Math	62%	63%
STEM-ready		
Passed Precalculus/ Calculus	56%	54%

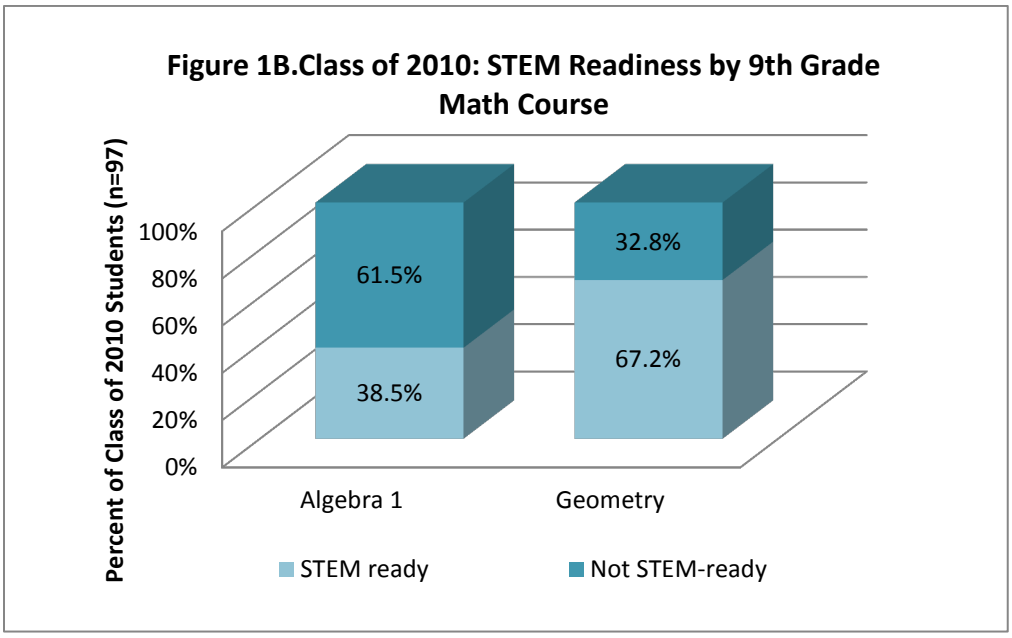
Appendix B. STEM Readiness

To determine whether a student graduated from SLA prepared to succeed in STEM fields in college, RFA created a "STEM ready" measure. College-level calculus is a prerequisite for most math and science majors in college. SLA graduates were categorized as "STEM ready" if they mastered pre-calculus sufficiently to be placed into college-level calculus on a math placement exam—having earned a C or better in pre-calculus or calculus prior to graduation from SLA. STEM readiness was positively associated with other traditional measures of academic performance. These correlations support RFA's use of the STEM readiness as a measure of the school's success in preparing students for college.

1. STEM readiness at graduation was significantly related to a student's 9th grade math placement (p<.01).

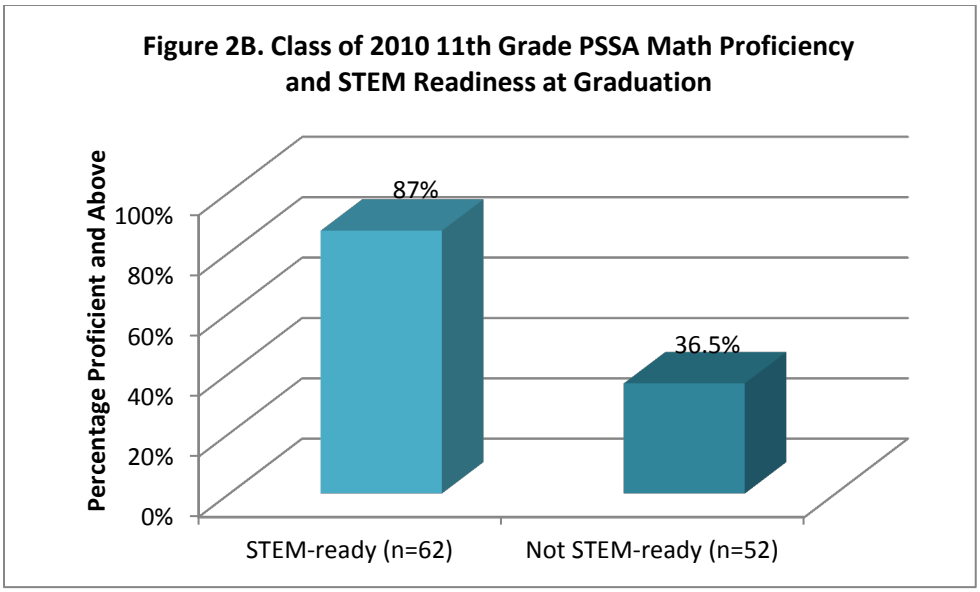
Figure 1B shows that nearly 70% of those who placed into Geometry in 9th grade were STEM-ready by graduation. In contrast, less than 40% of those who took Algebra 1 in 9th grade were STEM-ready.

Figure 1B. Stem Readiness by 9th Grade Math Course

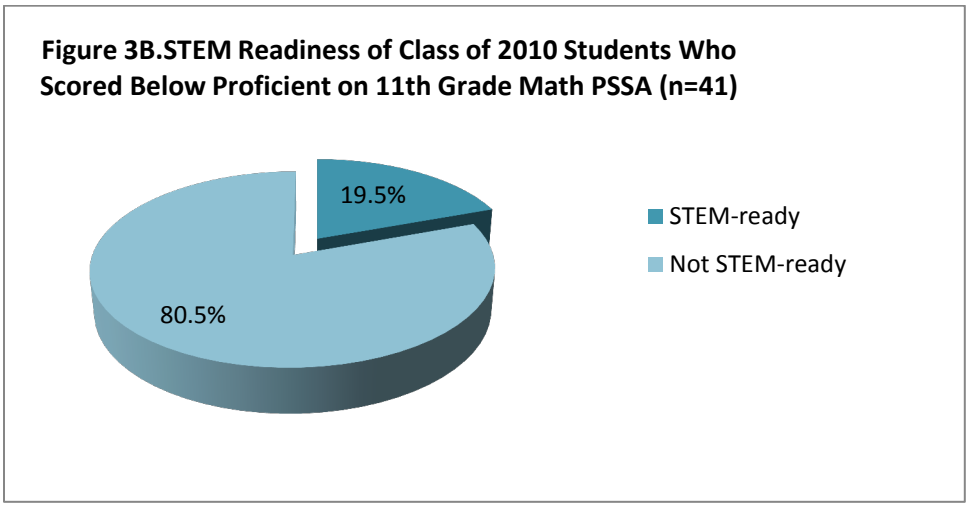


2. STEM readiness was also significantly related to 11th grade proficiency in math on the PSSA (p<.001).

As Figure 2B shows, a strong majority (87%) of those who graduated STEM-ready also scored proficient and above on the 11th Grade math PSSA. In contrast, of those who were *not* STEM-ready at graduation, only 37% scored proficient and above.



PSSA math proficiency, however, is not a strong proxy for students' STEM readiness. As evident in Figure 3B, approximately 20% of those who scored below proficient in math went on to successfully complete pre-calculus or calculus by 12th grade.



3. STEM readiness was related to students' high school course grades.

Table 1B shows that the Class of 2010 students who were STEM-ready at graduation averaged a higher cumulative GPA and higher math and science course grades than their peers who were not STEM-ready.

Table 1B. STEM Readiness and Course Grades

Table 1B. Class of 2010: High School GPA, Average Math Grade and Average Science Grade by STEM Readiness			
	Cumulative GPA	Math Grade Average	Science Grade Average
STEM Ready (n=62)	3.44	83	88
Not STEM Ready (n= 53)	2.71	73	77