

## Care + Inquiry = Science Leadership Academy

### Qualitative Findings

Prepared for The Franklin Institute

March 30, 2012

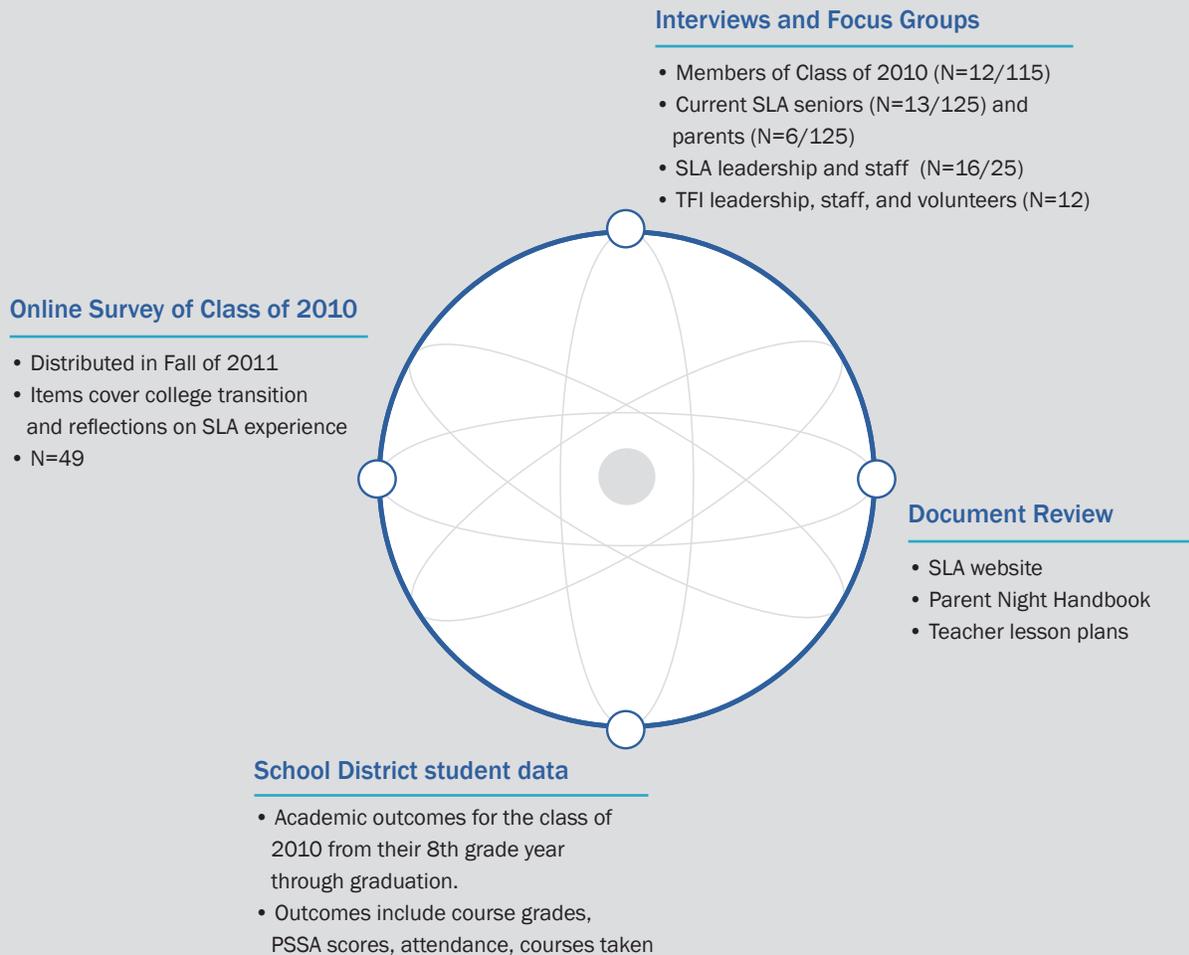


RESEARCH for *ACTION*

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:



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](http://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](http://www.researchforaction.org).

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## Care + Inquiry = Science Leadership Academy

March 30, 2012

### Introduction

The Science Leadership Academy (SLA) is a six-year-old Philadelphia high school, created through a partnership between the Franklin Institute Science Museum and the School District of Philadelphia that has begun to attract national attention for its inquiry-driven academic model and the accomplishments of its faculty and students.<sup>1</sup> SLA is a magnet school that admits less than 10 percent of applicants, and serves a racially and economically diverse student body drawn from the city's array of public, private and charter middle schools. Performance data from the most recent PSSA showed SLA student performance ranks it among the top tier of high schools in the School District of Philadelphia (SDP). See Table 1 and Figure 1 for a profile of SLA.

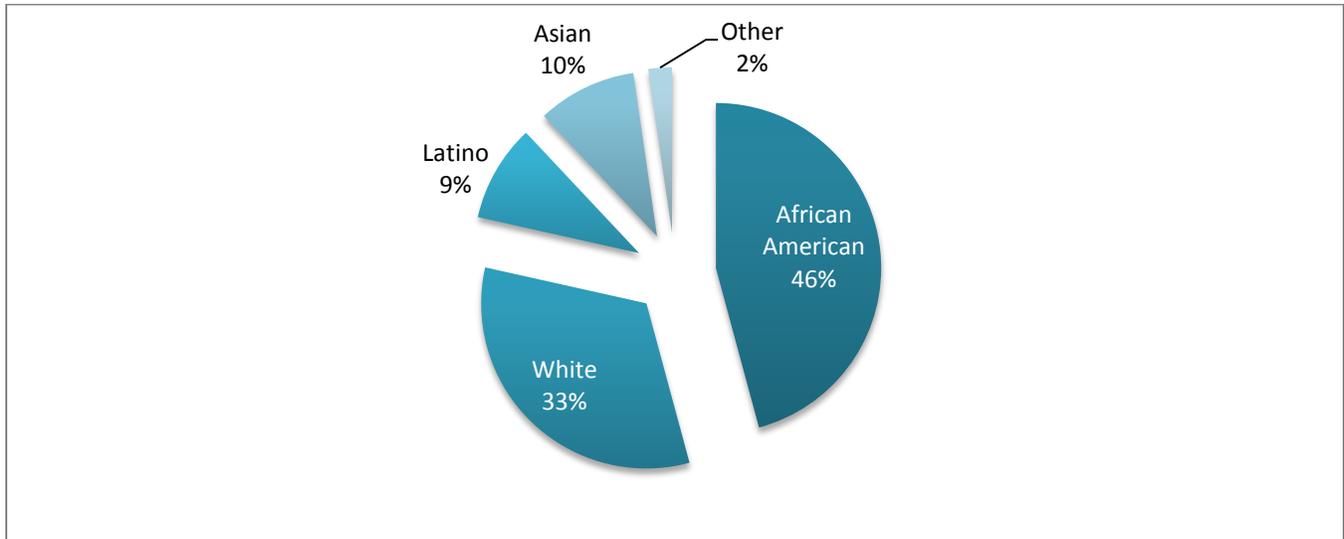
**Table 1. Profile of SLA**

Profile of SLA	
<b>Admissions criteria</b>	Advanced or Proficient PSSA scores As and Bs with the possible exception of one C Teacher and counselor recommendation Good attendance and punctuality
<b>Admissions rate</b>	6.25% (Approximately 2,000 applications for 125 spots)
<b>Average total enrollment (2009, 2010, 2011)</b>	486 9 <sup>th</sup> -12 <sup>th</sup> grade students
<b>Teacher-student ratio</b>	Approximately 1:19

<sup>1</sup> Davis, M. & Ash, K. (3/17/11). Students Seek Right Digital Fit. *Education Week*, Vol. 30, Issue 25, Page 26.; Davis, M. (6/15/11) Film Students Power Video-Production Business, *Education Week*, Vol. 30, Issue 35, Pages 21-22.; Quillan, I. (7/1/11) ISTE Wrap Up: By the Students not For the Students, Digital Education Week; [http://blogs.edweek.org/edweek/DigitalEducation/2011/07/iste\\_2011\\_wrap\\_by\\_the\\_students.html?qs=science+leadership+academy](http://blogs.edweek.org/edweek/DigitalEducation/2011/07/iste_2011_wrap_by_the_students.html?qs=science+leadership+academy); Quillan, I (6/29/11). Chris Lehmann's Ed-Tech Advice: Brothers not Networks; [http://blogs.edweek.org/edweek/DigitalEducation/2011/06/closing\\_keynote\\_brothers\\_not\\_n.html?qs=science+leadership+academy](http://blogs.edweek.org/edweek/DigitalEducation/2011/06/closing_keynote_brothers_not_n.html?qs=science+leadership+academy); Quillan, I. & Ash, K. (7/12/11). Educators Cite Research to Shift Ed-Tech Focus From 'Why?' to 'How?' *Education Week*, Vol. 30, Issue 36, Page 20.; Ginsburg, D. (7/2/11) Technology; Teacher Enhancement not Replacement. [http://blogs.edweek.org/teachers/coach\\_gs\\_teaching\\_tips/2011/07/technology\\_teacher\\_enhancement\\_not\\_replacement\\_1.html?qs=science+leadership+academy](http://blogs.edweek.org/teachers/coach_gs_teaching_tips/2011/07/technology_teacher_enhancement_not_replacement_1.html?qs=science+leadership+academy)

<b>% Economically disadvantaged in 2011-12</b>	<b>49%</b>
<b>PSSA rank in the SDP in 2010-11 (% scoring proficient or advanced)</b>	<b>SLA ranked 8<sup>th</sup> in Math SLA ranked 6<sup>th</sup> in Reading</b>

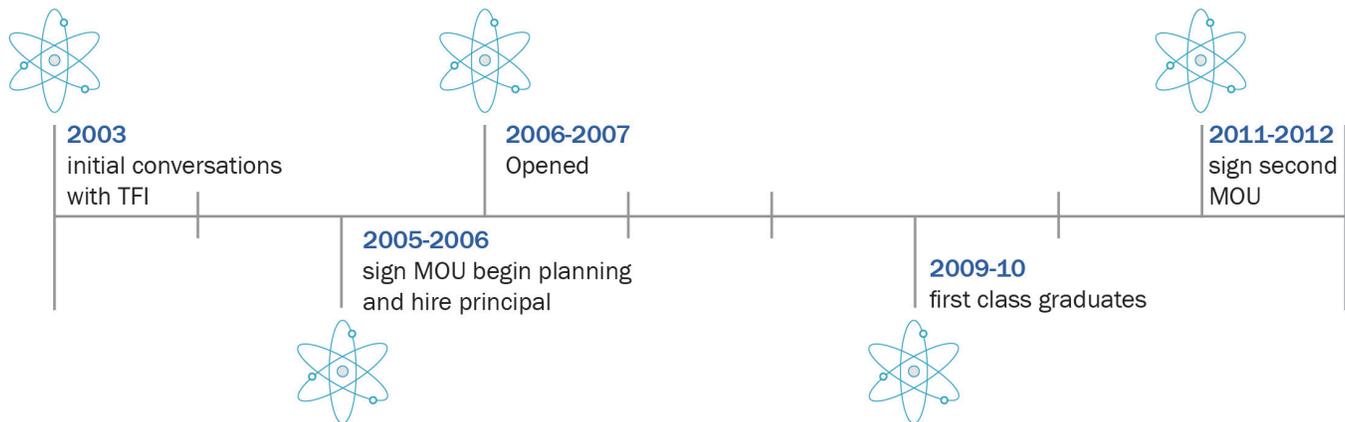
**Figure 1. SLA Student Body Ethnicity, 2011-12**



In a resource-poor district plagued by underperforming schools and in an era of high-stakes testing, SLA provides an important example of an alternative educational model. In 2011, TFI commissioned Research for Action to study SLA. This research brief examines the SLA model to inform efforts to sustain the model as well as replication efforts. We describe the SLA model, including its history and partnership with the Franklin Institute (TFI) and highlight strengths and challenges that emerged from the pilot data which should be examined in future research and considered in replicating and sustaining the model. In addition, we aim to identify key enabling conditions that would be important for replication of the model. The brief is organized in the following six sections:

1. Founding of SLA
2. SLA-TFI Partnership
3. SLA's Pedagogical Model
4. SLA's School Climate
5. Key Enabling Conditions
6. Challenges
7. Conclusion and Recommendations

## Founding of the Science Leadership Academy



SLA opened its doors in 2006-07 during a period in which then CEO of the SDP, Paul Vallas, was focused on the creation of small high schools of choice in Philadelphia. During a five-year period, 25 new small high schools were created. Unlike other districts creating “small schools,” Philadelphia had no outside resources to create these high schools. Therefore, Vallas enlisted the support of number of local and national partners to help with the design and start-up of small schools. One partner was TFI, a renowned science museum and educational center with a long history of partnering with the SDP to support science education. It also had a history of providing professional development for teachers and hosted thousands of school fieldtrips.

Partnering with the SDP to develop a new small high school was a first for TFI and called for a different level of involvement in public education than it had previously undertaken. The proposed school was to have a Science, Technology, Engineering, and Math (STEM) focus, befitting TFI’s commitment to informal STEM education. In 2003, TFI’s president and CEO, Dennis Wint, who had founded a STEM middle school in a previous position, agreed to work with the SDP to create SLA.

A memorandum of understanding with the SDP was signed in 2005, resources were identified for a planning process and Chris Lehmann was hired as the school’s founding principal. In designing the SLA pedagogical model, Lehmann’s vision of an inquiry-driven, project-based approach was integrated with TFI’s desire for a STEM-focused high school. The inquiry-driven approach was a natural choice for a TFI-sponsored school as it aligns well with the informal science learning approach used in science museum education and integral to the TFI mission. TFI brought its leverage to bear on the design of the school and was able to negotiate flexibility with regard to the SDP’s Core Curriculum.<sup>2</sup> In addition, like all of the new small schools, SLA hired its own faculty through a site selection process.

### More than a STEM School

SLA offers STEM-rich learning experiences, but is not a STEM-only school. While a variety of factors – including the partnership with TFI, a variety of STEM course offerings, and the school’s name – buoy up SLA’s classification as one of the STEM-focused high schools gaining visibility nationally, SLA leadership strives for a broader vision in which inquiry is threaded through all content areas. The inquiry-driven approach encourages students to pursue their areas of interest – STEM-related or

<sup>2</sup> Philadelphia’s Core Curriculum is a set of documents that outlines the skills and concepts that students are required to learn in each subject area and at each grade level. It began to roll out in some content areas and grade levels in 2003 and was accompanied by sets of textbooks, assessment materials and other resources for instruction (Public School Notebook, Vol. 12, 2004).

otherwise. Students see the "scientific" identity of the school reflected in the fact that they are taught to think critically and use the scientific method in approaching questions.

All students at SLA, however, take four years of rigorous STEM classes. In addition, for students with a particular interest in STEM, SLA offers an array of science electives and science-related independent learning experiences through TFI and other partners including area universities and hospitals.

As Table 2 shows, the STEM curriculum at SLA is distinctive as compared to other magnet schools because it offers the following:

- Integrated bio-chemistry classes for 9<sup>th</sup> and 10<sup>th</sup> grades;
- Required technology courses for freshmen;
- Required engineering course for freshmen ;
- Engineering electives for all grades; and
- Independent learning opportunities that allow STEM-focused students to take university-level STEM Classes or conduct independent research with the support of a mentor.

SLA's math curriculum is similar to that of other magnet schools. All students are required to take three years of math, which is an SDP requirement. Students who enter with advanced math skills can take calculus or more advanced courses at local universities before graduating. Students are not, however, required to take pre-calculus to graduate.

**Table 2. SLA STEM curriculum as compared to the District's high school curriculum and that of other Philadelphia Magnet Schools**

	SLA	Other Philadelphia Top-Ranking Magnet Schools <sup>3</sup>
<b>SCIENCE</b>	<ul style="list-style-type: none"> <li>• <b>9<sup>th</sup> and 10<sup>th</sup> grades: Integrated biochemistry</b></li> <li>• <b>11<sup>th</sup> grade: Physics</b></li> <li>• <b>10<sup>th</sup> through 12<sup>th</sup> grades: Option for four science electives</b></li> <li>• <b>9<sup>th</sup> grade: Wednesdays at the Franklin</b></li> <li>• <b>10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grades: Independent Learning Projects and Senior Capstone Projects at TFI, and other area museums, hospitals and universities.</b></li> <li>• <b>May take college-level science classes at area universities</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>9<sup>th</sup> grade: Biology</b></li> <li>• <b>10<sup>th</sup> grade: Chemistry</b></li> <li>• <b>11<sup>th</sup> grade: Physics</b></li> <li>• <b>10<sup>th</sup> through 12<sup>th</sup> grades: Science electives vary by size of school</b></li> <li>• <b>9<sup>th</sup> through 12<sup>th</sup> grade: Also offered advanced placement and IB science classes</b></li> <li>• <b>May take college-level science classes at area universities</b></li> </ul>

<sup>3</sup> RFA looked at the publicly available curriculum for three of the District's top ranking magnet schools: Central High School and The Julia R. Masterman School, Bodine High School for International Studies, as well as one magnet STEM high schools, the High School for Engineering and Science, and the Academy at Palumbo, as small magnet high school created in the same year as SLA. In the Class of 2010 brief, we compare STEM outcomes only with Palumbo and Bodine because they were similar in size and admissions criteria and because Palumbo opened the same year as SLA.

<p style="text-align: center;"><b>MATH</b></p>	<ul style="list-style-type: none"> <li>• 9<sup>th</sup> grade: Algebra 1 or Geometry</li> <li>• 10<sup>th</sup> grade: Geometry or Algebra 2</li> <li>• 11<sup>th</sup> grade: Algebra 2 or Pre-calculus</li> <li>• 12<sup>th</sup> grade: Pre-calculus, statistics or calculus</li> <li>• May take higher level math classes offered at area universities</li> </ul>	<ul style="list-style-type: none"> <li>• 9<sup>th</sup> grade: Algebra 1 or Geometry</li> <li>• 10<sup>th</sup> grade: Geometry and/or Algebra 2</li> <li>• 11<sup>th</sup> grade: Algebra 2 and/or Pre-calculus</li> <li>• 12<sup>th</sup> grade: Pre-calculus or Calculus and other electives</li> <li>• <b>Also offer advance placement and IB math classes.</b></li> <li>• May take higher level math classes offered at area universities</li> </ul>
<p style="text-align: center;"><b>TECHNOLOGY</b></p>	<ul style="list-style-type: none"> <li>• 9<sup>th</sup> grade: Required technology course</li> <li>• 10<sup>th</sup> through 12<sup>th</sup> grades: Computer science elective</li> <li>• 10<sup>th</sup> through 12<sup>th</sup> grade: Technology related ILP's including internships or courses at area universities</li> <li>• 1:1 laptop program and informal use of technology in the school</li> </ul>	<ul style="list-style-type: none"> <li>• Required technology course for freshmen at one other magnet school<sup>4</sup></li> <li>• Computer science electives starting in 10<sup>th</sup> grade in multiple magnets</li> <li>• Also offer advance placement and IB technology classes</li> <li>• May take higher level math classes offered at area universities</li> </ul>
<p style="text-align: center;"><b>ENGINEERING</b></p>	<ul style="list-style-type: none"> <li>• <b>9<sup>th</sup> grade: Required engineering course</b></li> <li>• 10<sup>th</sup> through 12<sup>th</sup> grades: Engineering electives</li> <li>• <b>10<sup>th</sup> through 12<sup>th</sup> grades: Engineering related ILP's including internships or courses at area universities</b></li> </ul>	<ul style="list-style-type: none"> <li>• None offered</li> <li>• Engineering and <b>biomedical curricular options</b> at one other magnet school<sup>5</sup></li> </ul>

## SLA-TFI Partnership

SLA's partnership with TFI operates at multiple levels: TFI serves as a learning resource for students and teachers, a reference point for parents and students when choosing high schools and a political champion for SLA in the SDP. .

**SLA and TFI partner in numerous programmatic efforts that expand SLA's STEM curriculum.** (See Table 3 for an overview of these activities and their strengths and challenges). These programmatic efforts, underwritten by TFI, have been slower to develop than other elements of the partnership. At the time of our research, administrators, faculty, and TFI staff reported that although there were pockets of success, these activities had not yet reached their potential. Challenges included:

- **Communication between SLA teachers and TFI program staff was very limited.** We heard from both teachers and program staff that increasing time for communication and collaboration across institutions would allow greater alignment of students' TFI experiences, particularly freshman mini-courses, to students' school experiences. Beginning in 2011-12, a liaison position was created to address this dilemma.
- *It would be nice to know what kind of courses the kids are taking right now, as they come in for the mini course. What's their normal schedule like? What are they taking? Obviously English, History, but what*

<sup>4</sup> Bodine High School for International Studies

<sup>5</sup> High School for Engineering & Science

*are they studying? What kind of science are they studying? I think that would be important. I don't know that, and I think that would be good if they could share that with us. (TFI mini-course instructor)*

*RFA: And, how familiar are you with SLA's model of pedagogy? TFI ILP supervisor: Not much at all... It's not that we're in the dark shooting blanks, but I would say, while they may have their pedagogy, we have not had a lot of opportunity to learn more about what it is that they would like to see happening here at the institute, in terms of being consistent with their pedagogy. (TFI mini-course instructor)*

- **Identifying the right TFI staff or volunteers to work with SLA students.** TFI mini-courses were taught by a mix of TFI staff and volunteers. Some were content experts but had very little teaching experience, and almost none had experience with project-based learning or inquiry-driven instruction. Consequently, the majority of students in our focus groups reported that these lessons were often not engaging.

Table 3 describes programmatic efforts designed to directly benefit students and supplement their school-based STEM education, and evaluates the strengths and challenges of each activity as reported by TFI staff and volunteers and SLA students as of 2011-12.

**Table 3. Status of TFI-SLA Programmatic Partnership Activities<sup>6</sup>**

Key		
Needs improvement	Satisfactory	Fully Successful

Activity	Description	Comments
9 <sup>th</sup> Grade Wednesdays at the Franklin	9 <sup>th</sup> grade students spend every Wednesday afternoon at the Franklin Institute. Four times a year, students have an opportunity to choose from month-long mini-courses on various topics related to STEM or nonprofit management. During non-mini-course times, students participate in activities related to TFI exhibits including creating	<p><b>Strengths:</b></p> <ul style="list-style-type: none"> <li>• The addition of mini-courses in 2007-08 was reported to have improved students' assessment of Wednesdays at the Franklin, but quality varied by course.</li> <li>• The use of student teachers from a local university was also described as a promising development.</li> <li>• The program supports common planning time for SLA faculty because all freshmen are out of the building.</li> </ul> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• TFI mini-course activities are not aligned with the SLA curriculum</li> <li>• Mini-course instructors often utilize more traditional pedagogy than is used in SLA classrooms.</li> <li>• Freshman are still learning to be independent learners and do not always make best use of less structured TFI non-mini-course time.</li> </ul>

<sup>6</sup> As reported by key stakeholders.

	narration or podcasts about museum exhibits. Students are also consumers of exhibits and/or IMAX movies.		
<b>ILPs at TFI</b>	Students do independent projects with scientists or other staff at TFI.	<b>Strengths:</b> <ul style="list-style-type: none"> <li>Students and parents describe a high level of student engagement in these activities and students appreciate the exposure to "professional" scientists.</li> </ul>	
<b>TFI speakers at SLA</b>	TFI brings scientists to Philadelphia and these guests often visit and speak at SLA.	<b>Strength:</b> Students appreciate the opportunity to meet influential scientists and STEM-oriented students report being inspired by these experiences.	
<b>Teachers draw on TFI resources for instruction</b>	Teachers take classes to view exhibits or utilize TFI archival materials in classroom instruction.	<b>Strength:</b> <ul style="list-style-type: none"> <li>A new liaison position for the partnership was recently created to facilitate communication between SLA teachers and TFI staff.</li> </ul>	<b>Challenge:</b> <ul style="list-style-type: none"> <li>SLA teachers don't feel knowledgeable about TFI resources to be able to incorporate them in their instruction.</li> <li>SLA teachers feel they have limited time to explore the possible resources at TFI.</li> </ul>
<b>Family Memberships</b>	Every SLA student gets a four year family membership to TFI.	<b>Strength:</b> 70% (9/13) of current seniors in focus groups reported using their TFI family memberships. More data is needed to determine membership usage.	
<b>Financial Resources for individual students.</b>	TFI provides scholarships for SLA graduates and has provided resources to fund student presentations at conferences.	<b>More information is needed to assess the this component of TFI supports.</b>	

**For some parents and students, TFI has also served as reference point in evaluating the school as a potential option for their children.** Parents told us that the credibility of TFI gave them confidence to enroll their child in SLA, particularly in the first few years when the school was not well known.

**At the political level, TFI functions as a valuable champion for SLA in positioning itself within the SDP.** TFI's involvement enabled SLA to have a smoother start-up than other small high schools that were created without the assistance of a high-profile partner. It also gained SLA greater flexibility with the SDP's Core Curriculum, which allowed SLA the freedom to create its own curriculum. In 2011, TFI helped SLA negotiate a new memorandum of understanding with the SDP that included provisions that: (1) the school remain within walking distance of TFI—an important concern as

the SDP makes decisions about closing and moving schools; and (2) SLA hire a liaison who would help facilitate the programmatic efforts between the SLA and TFI. In addition, the memorandum specified that TFI would continue to have the right to hire a principal for SLA, and SLA would have the right to hire its own faculty. TFI's President, its Vice President of Innovation, and its Board of Directors are in regular contact with the school and TFI has also occasionally provided funding for specific SLA initiatives.

## SLA’s Pedagogical Model: The Intersection of Inquiry & Care

SLA’s inquiry-driven approach to learning means that students are at the center of instruction and asked to take ownership of their own learning by pursuing questions that interest them with guidance from their teachers. Using this model, SLA’s principal states that this model shapes students into "thoughtful, passionate, caring, and wise" adults who are full and active citizens. At SLA, implementing the inquiry-based instructional approach is closely intertwined with creating a school climate that students find caring, safe, accepting, and interested in their opinions. In the words of the principal:

*I think the two intersecting schools of thought of SLA are inquiry and care. The intersection between inquiry and care is “What do you think?”...To ask that question and deeply listen for the answer is the ball game. And then for teachers to take action on those answers and to help kids develop those answers, that is the ball game.*

In the following sections, we outline: (1) the components of SLA’s instructional model; (2) the school climate (3) the conditions in the SLA context that enable the model to be implemented with coherence; (4) questions and tensions in the model that emerged in our research. SLA’s inquiry-based model and caring school climate, supported by these enabling conditions, shows signs of promise. Data from SLA’s first graduating class, the Class of 2010, point to a variety of positive outcomes for students, as well as some that questions for SLA to consider. RFA reports on these findings in an accompanying research brief, “The First Graduating Class of the Science Leadership Academy: Class of 2010.”

### Components of a Coherent Inquiry-Driven Instructional Model

Both in and out of class, SLA students are given opportunities for inquiry-driven, project-based learning as well as experiential learning. RFA’s interviews with administrators, teachers, current seniors and their parents as well as alumni, point to significant coherence in the implementation of SLA’s model, **although further research with a broader sample of students, teachers and parents would be needed to confirm this finding.** Instructional coherence, as defined by Newmann (2001),<sup>7</sup> is a characteristic of high performing schools. Tables 4-9 define the key elements of SLA’s inquiry-based instructional model.

**Table 4. Instructional Approach**

Element of Model	Description
<p><b>Five core values</b></p>	<p><b>SLA’s instructional approach is founded in five core values.</b> These are posted throughout the school and were cited regularly by the students and staff we interviewed. Notably, alumni, even more than a year after graduating from SLA, were able to name the five core values and clearly describe how those values were integrated into their projects and the rubrics used to assess the projects:</p> <ul style="list-style-type: none"> <li>• Inquiry</li> <li>• Research</li> <li>• Collaboration</li> <li>• Presentation</li> <li>• Reflection</li> </ul>

<sup>7</sup> Newman, F.M., Smith, B., Allensworth, E. & Bryk, A.S. (2001). School Instructional Program Coherence: Benefits & Challenges. Chicago; CCSR.

<p><b>Grade-level themes &amp; essential questions</b></p>	<p><b>Interdisciplinary work is supported by essential questions organized around grade level themes.</b> Teachers are encouraged to plan together in grade groups to integrate the essential questions and themes into their coursework. The themes are:</p> <ul style="list-style-type: none"> <li>• 9<sup>th</sup> Grade: Identity</li> <li>• 10<sup>th</sup> Grade: Systems</li> <li>• 11<sup>th</sup> Grade: Change</li> <li>• 12<sup>th</sup> Grade: Creation</li> </ul>
<p><b>Understanding by design framework</b></p>	<p><b>Teachers used Understanding By Design (UBD), a framework for curriculum planning.</b> In the UBD framework, teachers first identify what they want students to know and be able to produce at the end of a curriculum unit, and then develop the lessons that will build to the culminating assessment.</p>
<p><b>Vertical alignment</b></p>	<p><b>SLA faculty have more recently begun to work on vertical alignment within disciplines,</b> meeting as disciplinary groups to craft standards for learning across grade levels.</p>

**Table 5. Student Supports**

<p><b>Element of Model</b></p>	<p><b>Description</b></p>
<p><b>Advisories</b></p>	<p><b>A four-year advisory structure ensures one faculty member knows students and families particularly well.</b> The advisory system is the primary formal structure for creating the caring and trusting environment that exists at SLA.</p> <p>Students are introduced to their advisor and their advisory group during their 9<sup>th</sup> grade summer orientation. Once school begins, they have 45-minute advisory periods twice per week. Advisors serve as the primary point of contact for parents. During parent-teacher conferences, parents meet only with their student's advisor, who has collected comments from each of the student's teachers. Parents appeared to appreciate this model, particularly the deep knowledge the advisor developed about their child.</p> <p>The school prioritizes providing teachers with the professional development they need to be supportive advisors. An advisory committee develops materials and suggests monthly topics that advisors can use. However, advisors have the autonomy to decide how best to use the time with their students. One advisor described advisory being responsive to student needs:</p> <p style="text-align: center;"><i>Because half the time it's like your advisees come in and they are all freaked out about something or other, and so it's like the 20 of us are going to discuss it.</i></p> <p>The principal also emphasizes the consistent use the advisory structure. For example, whenever emails are sent home to parents regarding a particular students' performance, the advisor is copied on the email. When students are sent to the office, the principal makes a point to pull the students' advisor into any disciplinary conversations they may have with the student and/or the students' parents.</p> <p>Also, the student's advisor takes the lead on college transition activities for their advisees.</p>

<b>College transition supports</b>	<p><b>SLA emphasizes college-going, and offers a variety of supports during junior and senior year to assist students and parents with college applications and financial aid.</b> A full-time college counselor coordinates all of the college supports and related activities, and relies on the advisors to guide individual students through the process. SLA has a second counselor who provides social and emotional supports, allowing the college counselor to focus on the college selection and application process. <i>(See Figure 1B in Appendix B.)</i></p> <p><b>SLA has improved its college transition supports since the first graduating class.</b> The principal says that they have learned lessons from the experiences of the first graduating class. The staff, principal, counselor are becoming more familiar with colleges—the pros and cons of different choices—and getting better at guiding students to schools that are good fits, are affordable, and within reach. <i>(See Figure 1B in Appendix B.)</i></p>
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**Table 6. Instructional Format**

Element of Model	Description
<b>Project-based learning</b>	<p><b>Students are asked to do independent and group research projects in all their classes.</b> Class periods are 90-minute blocks, allowing students to engage deeply in their learning. In completing projects, students undertake the five steps outlined by SLA’s core values.</p>
<b>Classroom discussion</b>	<p><b>Teachers describe drawing on the five core values to develop their instructional approach.</b> Classrooms are characterized by teacher facilitated discussions heavy on questioning as well as group work.</p>
<b>Experiential learning outside the classroom</b>	<p>SLA leadership and staff believe that the purpose of high school is not only to prepare students for the real world <i>after</i> graduation, but to engage them in the real world <i>before</i> they graduate. Opportunities for experiential learning extend beyond the classroom:</p> <ul style="list-style-type: none"> <li>• <b>Mini-courses:</b> 9<sup>th</sup> graders spend Wednesday afternoon at TFI, where they sign up for month-long mini-courses, often taught by scientists.</li> <li>• <b>Independent Learning Projects (ILPs) :</b> 10<sup>th</sup> and 11<sup>th</sup> graders are matched with ILPs. These are individual projects or college classes, but are most often internships at local organizations. <i>(See Table 2B in Appendix B for examples of ILPs.)</i></li> <li>• <b>Capstones:</b> Seniors develop individual projects worked on with the support of a mentor. <i>(See Table 3B in Appendix B for examples of Capstones. )</i></li> </ul>

**Table 7. Assessment**

Element of Model	Description
<b>Project-based assessment</b>	<b>Assessment is done primarily through projects rather than tests.</b> Students are asked to do projects throughout a term, as well as a larger benchmark project toward the end of each quarter. Projects are graded using a rubric that aligns with the school’s core values, assessing each project on "Design, Knowledge, Application, Presentation and Process."
<b>Some “mastery” tests</b>	<p><b>Since 2010-11, teachers give standards-based "mastery" tests.</b> These assess student knowledge of key concepts aligned with school and state standards. Students must re-take these tests if they don't pass the first time, which teachers believe empowers students to take responsibility for their performance. Standards-based grades are given in the second and fourth quarters; narrative grades are given in the first and third quarters. SLA students are not required to take District benchmark assessments which align with the state exam.</p> <p>The addition of tests to the SLA model reflects two key issues staff identified during the school’s early years:</p> <ul style="list-style-type: none"> <li>• Once in college, early SLA graduates wished they’d had more experience taking tests.<sup>8</sup></li> <li>• By breaking up course material into smaller components, teachers said that students were less likely to believe that they were “bad at everything.”</li> </ul>

**Table 8. Use of Technology**

Element of Model	Description
<b>One-to-one laptops</b>	<b>Each student receives a laptop.</b> All freshman take a foundational technology class to ensure that they have the technology skills to be successful at SLA, where in lieu of textbooks, students’ laptops allow them to access online learning resources. Students also use their laptops to share their learning with others by blogging and creating multi-media presentations and laptops facilitate participation in the school community.
<b>Online course management system</b>	<b>Technology facilitates sharing classroom resources and activities, submitting homework and tracking student progress.</b> The Moodle system is the online course management service used by SLA teachers, students and parents. Teachers post assignments and grades to the Moodle system. Students can check and post their homework assignments. Students and parents are able to keep track of student’s progress throughout the academic term.

<sup>8</sup> See the accompanying research brief, “The First Graduating Class of the Science Leadership Academy: Class of 2010,” for more detail.

<p><b>Network-based communication</b></p>	<p>SLATE is SLA’s online information directory with all the contact information of students. Teachers, advisors and staff are able to communicate with each other and student’s parents. It is used to send emails to the SLA community and facilitates communication among a student’s core academic group, including their advisor, parents and teachers.</p> <p><i>The [SLATE] network is a living metaphor of everything we do. How we set up the school is based upon that [the network], how we work as a faculty and also how we work in classrooms, and how learning actually is shared, all comes thorough the technology and the computers, and it really serves as the backbone for that overall metaphor that learning is networked. (Teacher)</i></p>
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**Table 9. Exposure to Broader Scholar Community**

Element of Model	Description
<p><b>EduCon</b></p>	<p><b>EduCon is an annual conference co-hosted by SLA and TFI since 2008.</b> It attracts 500 educators from around the world who are interested in inquiry-based pedagogy. SLA faculty, students and parents are integrally involved in the planning and implementation of EduCon. EduCon is also a fundraiser for SLA, raising approximately \$50,000.</p>
<p><b>Partnership with TFI</b></p>	<p><b>The TFI-SLA partnership provides students with multiple opportunities to interact with scientists.</b> As described above, students benefit directly from the partnership with TFI in multiple ways. Students interact with TFI scientists through mini-courses, internships, and special TFI events. Annually, TFI awards a prominent scientist, who also visits SLA when they come to TFI to receive their award. TFI has also helped SLA develop science-related partnerships and internships outside of the Franklin Institute.</p>

## SLA’s School Climate

School climate is a key foundation for an effective learning environment. Bryk & Schneider (2002)<sup>9</sup> have documented that “social trust” among teachers, students, administrators and parents is associated with effective schools, i.e., schools able to demonstrate growth in student learning. RFA interviews with teachers, current seniors, their parents, and alumni provide consistent evidence that SLA has a "socially trusting" climate, **although further research with a broader sample of students, teachers and parents would be needed to confirm this finding.**

**Table 10. School Climate**

Finding	Illustrative Quotes
<p><b>Students reported close relationships with teachers and the school administrator.</b></p>	<p><i>The teachers don’t just help you when you’re doing badly, or when you’re really upset. They’re there for you even when you’re having a good day. You have a friendship almost. It’s different, because they’re teachers, and</i></p>

<sup>9</sup> Bryk, A. & Schneider, B. (2002). Trust in Schools: A Core Resource for Improvement. New York; Russell Sage Foundation.

	<p><i>there's respect there too, but a lot of times it's like a friendship. Or like a family relationship. Even with [Principal] Lehmann, I'll just go in and chat with him, even if I'm not upset or in trouble or anything like that.</i></p> <p>(Student)</p>
<p><b>Students and teachers describe supportive relationships between students</b> which creates a safe environment where students feel that they can be themselves and participate freely in classroom discussions.</p>	<p><i>And the ethic of care goes beyond teacher to student, what really moves me is the care between students.</i></p> <p>(Teacher)</p> <p><i>I found real friends and true people that helped me get through a lot of stuff here...</i> (Student)</p>
<p><b>Parents also find SLA to be a supportive environment</b>, particularly because faculty and the principal were accessible. All the parents we spoke to also praised the staff for their dedication to their children.</p>	<p>RFA: How would you describe your relationships with teachers at the school? <i>Parent: Excellent...they get back to me in a good timeframe, very energetic, willing to think about how to deal with particular issues that come up all the time, really creative.</i></p> <p><i>These teachers are so far more dedicated than teachers at [other magnet school her daughter attended]. It's unbelievable. And my daughter just blossomed here.</i></p> <p>(Parent)</p>
<p><b>Teachers describe an environment in which all faculty are focused on caring for students.</b></p>	<p><i>It's part of the school culture. It's from all of us. It's also from Chris [Principal Lehmann]. I see kids come in and he's like 'Oh what's wrong?' He's not just the principal and we're not just teachers. They see that in their math, science, and English classes, and they get the signals that their teachers care about them as people, not just what they are doing for the 65 minutes that they are in their classroom. It becomes part of the culture.</i> (Teacher)</p>
<p><b>There is a high degree of engagement and collaboration among teachers.</b></p>	<p><i>Coming from other places, being a first-year faculty, when we sit down to talk, the conversation is really driven by what is good for our students. It's not complaining, not wasting time, not on laptops. Everyone pitches in, sometimes we get into heated debates and arguments, and it is interesting to see the level of investment, even the quietest member of faculty, they're like, 'no, this is what I think we should do.'</i> (Teacher)</p>

**Important Enabling Conditions**

Several factors are important in creating and anchoring SLA's vision of inquiry-driven pedagogy and a school climate centered on care. Below we outline seven conditions that support the coherent

implementation of the inquiry-based model and help to facilitate the trust that was observed. They include:

1. A school leader with a clear and consistent vision;
2. A school leader who models norms of care;
3. Talented faculty members committed to the inquiry-driven vision, who are hired through a site selection process;
4. A distributed leadership model;
5. Robust frameworks, tools and structures to support teachers;
6. Shared language of teaching and learning; and
7. A small school size.

Each condition is detailed below.

**Table 11. A school leader with a clear and consistent vision.**

Finding	Supporting Quotes
<p><b>SLA's principal is critical to setting and maintaining the vision of the school.</b> He does this internally—among students and staff—and externally, with TFI, the school's key external champion, and with the District. He has also cultivated a national profile for the school through his blog, which describes the work of SLA, and through EduCon. Finally, the principal is the chief fundraiser for the school, bringing in additional resources to support the 1:1 laptop program and other special activities of the school. The principal endeavors to raise \$200,000-250,000 dollars each year.</p>	<p><i>I think that idea of...set the vision, be the sounding board, be the person who protects, be the person who nurtures, be the person who course corrects when need be, and then let people do the good work they need to do and it's my job. And raise the money.</i> (Principal)</p>
<p><b>The principal, with the help of his staff, is consistent with the use of the inquiry-driven model across the school.</b> This includes using an inquiry approach in both professional development with teachers as well as with parents.</p>	<p><i>The mistake is thinking that you can be this wonderful, caring, inquiry driven school for kids and then tell teachers exactly what to do that's a really bad idea. If you want kids to engage in inquiry you must create paths for teachers to engage in inquiry. Everything must be consistent.</i> (Principal)</p>
<p>While he fosters an extensive distributed leadership structure (described further below), <b>the principal constantly assesses whether emerging ideas of his faculty fit with the vision.</b> He also plays a key role in hiring faculty who will enact the vision of the school.</p>	<p><i>My job is to say, 'Does this work with the vision?' My job is to try and help everyone in the building find their role within the big vision and to make sure the big vision is always being nurtured and sort of honed and made better and my vision is my role is to be to my teachers the person that I want them to be to be to the kids.</i> (Principal)</p>

**Table 12. A school leader who models norms of care.**

Finding	Supporting Quotes
<p><b>The principal as a role model of care to students and teachers has been important in establishing norms of care in the school.</b> Students, teachers and parents all observed that the principal was key to setting the tone in the school.</p>	<p><i>RFA: How does SLA create that environment, where it feels safe to just be yourself, and say what you have to say?</i></p> <p><i>Sr. 1: Lehmann. Shout outs to Lehmann. [Lots of agreement in group.]</i></p> <p><i>Sr. 2: He creates a safe place.</i></p> <p><i>Sr. 1: He learns everyone’s names like two weeks into school year...</i></p>
<p><b>The principal’s open-door stance sets a standard for the accessibility expected of teachers.</b> His efforts to learn to know students and be involved and available make a deep impression on students and parents. He models the caring relationships and acceptance of difference that he expects of everyone else in the building—students and teachers alike.</p>	<p><i>Sr. 2: And he’s the type of principal, his door is always open. Whether it’s for chill time, for talk time, or just—</i></p> <p><i>Sr. 3: His physical door is open.</i></p> <p><i>[My] relationship with the principal is excellent. I think most kids feel a personal relationship with him at some level. He knows them all by name. He is very interested in everybody. (Parent)</i></p>
<p><b>The principal models care for students through caring for teachers.</b></p> <p>Part of caring for his teachers was an attentiveness to faculty workloads.</p>	<p><i>If you want your teachers to treat the kids with an ethic of care, there has to be an ethic of care at the next level as well. So I think it’s everything; I think you can’t micro-manage and expect your teachers to be these deep, powerful transformative educators. You have to create cultures that are nurturing for everyone. (Principal)</i></p>

**Table 13. Talented faculty members committed to the inquiry-driven vision, who are hired through a site selection process.**

Finding	Supporting Quotes
<p><b>SLA has attracted a talented group of teachers committed to the vision of the school.</b> In the site-selection process, candidates are interviewed by teams that include the principal, parents, and faculty members. The principal describes hiring criteria as being aligned with the vision and values of the school. Teachers do not have to have previous experience with inquiry-driven, project-based learning. They need a desire to learn an inquiry-driven approach as well as a commitment to caring</p>	<p><i>I also want to point out that one of the reasons that we get to work with all these people that generally have the same flow forward is because this was a school that was started with particular vision in mind, and people came to it. (Teacher)</i></p>

for young people.	
<b>The school sets consistently high standards for teachers.</b>	<p>Multiple teachers in focus groups described the high standards for teaching set by their colleagues.</p> <p><i>You have to be somewhat humble to work here. When people ask me what it's like to work here, I say, look, I'm not the 5<sup>th</sup> best teacher in the building, I may be the 5<sup>th</sup> best teacher in the east wing of the 3<sup>rd</sup> floor...there are lots of people who are superb teachers, so there is a lot of pressure in terms of trying to make sure that what you do is particularly good. (Teacher)</i></p>
<b>Faculty have the support of students, alumni and parents.</b>	<p>Current students, alumni and parents also consistently described the school faculty as being a talented and dedicated group.</p> <p><i>Yeah, they would stay here, like, really late sometimes. I remember my math teacher in sophomore year would to stay here until like 6 o'clock at night helping kids learn geometry and algebra and stuff. (2010 Graduate)</i></p> <p><i>(There is a) very supportive dynamic, young faculty. I feel like I have to mention the fact they are young for the most part - only because I think there is a certain energy level there and...the young staff is so free with their time. It is not uncommon for our staff to be there at 5:00pm, 5:15pm, 5:30pm, 6:00pm. (Parent)</i></p>

**Table 14. A distributed leadership model.**

Finding	Supporting Quotes
<p>With the cadre of dedicated faculty, the principal- has fostered <b>a distributed leadership structure in which teachers have the autonomy to create the curriculum and shape the larger the school environment.</b></p>	<p><i>We also are in an autonomous learning community with an awful lot of shared power and a shared agenda, and an open door policy. It's a very flat administrative structure where people are encouraged to take on a load that they see needs to be borne. ... This is where I want to be, because I can be a person who can have the ability to change the school or impact the school, or bring my talents and abilities and actually see that be a part of the school, not fit into some preexisting system. (Teacher)</i></p>

<p><b>Distributed leadership is formalized through committees.</b> As the school grew in size, committees formed to facilitate teacher input into the school's development. Committees are empowered to examine an issue and make recommendations or decisions themselves and communicate the decisions to the whole faculty via the school's listserv. Examples of committees include:</p> <ul style="list-style-type: none"> <li>• Academic standards committee;</li> <li>• Advisory committee;</li> <li>• Restorative justice committee; and</li> <li>• Multiculturalism committee.</li> </ul>	<p><i>As we've grown from a staff of eight that could sit at the table and discuss every issue to a faculty of about 25, [I've learned] how important committees are and how important it is to truly empower those committees and empower people to do the work that needs to be done and understanding that you don't have to drag 30 people through every decision. Having that sense of letting people workshop things and then bring it to the whole group. (Principal)</i></p>
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**Table 15. Robust frameworks, tools and structures to support teachers.**

Finding	Supporting Quotes
<p>The supports and frameworks in place for teachers help sustain the inquiry-driven vision for the school because they <b>acclimate new teachers, students, and parents quickly to the school community.</b></p>	<p><i>We have very very deep rich patterns and habits and pathways for people to plug right into, students and teachers. (Principal)</i></p> <p><i>When we came in as founding faculty, this [UBD] is something that we developed along with a co-created rubric [for projects] that's standard through the entire school. It's really about creating a common language and when we're all on that same page of common language and common planning, then we're able to articulate that to the kids. That means that we've deepened the learning for everybody. That's why I like [UBD]. (Teacher)</i></p>
<p><b>Teachers are encouraged to collaborate and supported through significant common planning time,</b> which is possible because their schedule is structured to teach fewer classes. Common planning time is made possible through the following structures:</p> <p><u>Faculty meetings:</u> SLA's entire faculty meets for two hours once/week on Wednesday afternoons</p> <p><u>Grade Groups:</u> Teachers working with students in a particular grade meet to discuss curricular or advisory issues for a cohort.</p> <p><u>Disciplinary Groups:</u> Teachers working within the same discipline meet to discuss vertical alignment within content areas or other disciplinary topics.</p> <p><u>Partner teachers:</u> Most teachers have a partner teacher with the same subject and grade level and so these</p>	<p><i>We only teach 16 blocks out of the week. That is significantly less than any other teaching placement I've ever had. We have more prep time, a 65 minute lunch, the Wednesday common planning time. (Teacher)</i></p>

teachers frequently plan course activities together.	
<b>Professional Learning Communities (PLCs) are interdisciplinary and inter-grade-level teams that visit each other's classrooms.</b> PLC members provide feedback on one another's unit plans and instruction using a rubric created by a teacher. PLCs are formed by the principal and a teacher, and are created so that teacher free periods are misaligned to allow teachers to visit each other's classrooms and provide feedback.	<i>Professional learning communities that then work throughout the year, I mean we go into each other's classrooms, we use a Google form so that way people can give feedback on what they see, we comment on each other's unit plans, I don't think I am the only person that can read a unit plan I don't think I am the only person that should read a unit plan...We expect that you have a peer group that...we make sure that people's free periods are actually misaligned so that they can get into each other's classrooms that way</i> (Principal)
<b>New teachers are assigned a "buddy" teacher to support them throughout the school year.</b> In addition, new teachers benefit from all the other structures and frameworks that are in place to support teachers including common planning time and the use of technology to share lesson plans.	<i>For new teachers we buddy you up, you have a mentor teacher. There are a million systems...</i> (Principal)
<b>SLA teachers also receive external professional development, although teachers described external school-wide professional development as less central to their own professional growth.</b> Teachers described seeking out professional resources online. A few noted that their colleagues were the best resources for learning about inquiry-driven project-based learning.	<i>There are few people out there who push me to do things differently and most of them work here...I wouldn't be all that impressed with the people that were brought in. Like I feel like we're doing it better than a lot of others.</i> (Teacher)

**Table 16. Shared language of teaching and learning.**

Finding	Supporting Quotes
<b>SLA has created a strong, well-articulated common language about the school's inquiry-driven and project-based curriculum, instruction, and assessment.</b> This language is shared across key constituencies (staff, students, and parents), grades, and disciplines. All constituencies except parents name inquiry as one of the primary distinguishing characteristics of the school and place high value on its contribution to SLA's educational program. While parents less frequently mentioned inquiry as a distinguishing characteristic, they did name project-based learning often. They believed that student projects were good preparation for life and highly valued that experience for their children.	<i>"I think that asking questions is really important, and I think that we are constantly encouraging our students to ask questions before they start a project, while they are working on a project, and after they finish a project."</i> (STEM teacher)  RFA: What did you most appreciate about SLA? <i>Alum 1: "I feel that in every class they made us question everything. . ."</i> <i>Alum 2: "INQUIRY!"</i> <i>Alum 3: "Inquiry, there we go."</i> <i>Alum 1: "Inquiry, that's one of them. Yeah, important. In every class, physics, English..."</i>

**Table 17. Small school size.**

Finding	Supporting Quotes
<p><b>Small size is an advantage in creating a caring environment.</b> A decade of research has shown that small high schools can indeed improve climate, attendance, student and teacher satisfaction, and graduation rates.<sup>10</sup></p> <p>SLA's size of less than 500 students and the low teacher-student ratio (1:19) are an advantage in developing relationships with students.</p>	<p><i>And in terms of how it's different from the public high schools, I think small size, I think that the teachers—everyone here is on a mission, including the students, once they get into the culture. And it's a great mission. And so I think that the students have a sense of cohesiveness... (Parent)</i></p>

## Questions and Tensions

While the research revealed many strengths of SLA, questions and tensions were articulated as well. See Table 18.

**Table 18. Questions and Tensions**

<p><b>Aligning of SLA's curriculum with college expectations.</b> A few questions were raised by parents and students about how SLA's inquiry-based model would prepare students for a more traditional college learning environment:</p> <ul style="list-style-type: none"> <li>• <b>Writing:</b> Alumni in the class of 2010 reported feeling well prepared for writing in college and this is supported by their SAT writing scores (see Class of 2010 brief). However, several interviewees were concerned that students had not had enough experience writing research papers.</li> <li>• <b>Science:</b> Since students took integrated bio-chemistry classes, a question was raised about whether the depth of course content in each discipline was enough preparation for college level science. Alumni from the class of 2010 did report having challenging experiences in biology and chemistry but this was also associated with the nature of freshman science courses; large lecture classes reliant on testing.</li> <li>• <b>Testing:</b> A question was also raised about students' preparation for testing in college. This is a challenge experienced by alumni from the Class of 2010. SLA has begun to utilize standards-based mastery testing which may address this concern.</li> </ul>	<p><b>Writing:</b> <i>I'm much more of a traditionalist. I don't think they have learned how to do a good research paper. I think that is something they should really focus on for college-bound kids. (Parent)</i></p> <p><b>Course content in Biology and Chemistry:</b> <i>I think his big angst is that he never had biology and chemistry. He had biochemistry. It would be nice if they could offer advanced biology or chemistry so that they could have more exposure to one of the two sciences. (Parent)</i></p> <p><b>Testing:</b> <i>The only thing we have to mold into [adjust to] is the straight test and exam part of life. Aside from that, we'll be fine. (Student)</i></p> <p><i>I think the switch to standards-based [grading] is going to help with the testing, though. (Student)</i></p>
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<sup>10</sup> Recent studies of New York, Boston and Baltimore include: Huebner, Corbett, & Phillippo, (2007). *Rethinking High School: Inaugural Graduations at New York City's New High Schools.*, San Francisco, CA: West Ed, 2007; Tung, R. & Ouimette, M., (2007). *Strong Results, High Demand: A Four-Year Study of Boston's Pilot High Schools.* Boston, MA: Center for Collaborative Education; and *Baltimore City's High School Reform Initiative: Schools, students and outcomes.* (2007). Education Policy Center, Urban Institute.

<p><b>Providing support for teachers in learning the inquiry driven approach.</b> While SLA has extensive support mechanisms in place to help new and experienced staff, several parents observed that new teachers could use more support as they learned how to use an inquiry-driven approach.</p> <p>A few teachers agreed that they could use additional support.</p>	<p><i>Most of us haven't gotten any instruction besides ourselves trying to figure it out of how to do project-based learning, or inquiry-based learning, so we're all trying to figure it out together. And I personally feel like I haven't gotten that support from outside. No one's been brought in to talk to us about-- Or even the difference between problem-based learning and project based learning and inquiry-based learning. I don't really know how to differentiate between them.</i> (Teacher)</p>
<p><b>Teachers and parents reported that burnout is a concern.</b> In many small schools, principals and teachers are stretched thin and this concern was raised in interviews at SLA as well. Concerns were expressed for the principal, as well as for the teachers.</p>	<p>RFA: What are the challenges of creating a caring institution? <i>I think burn out. As teachers, we have so much emotional give that we can help kiddos and at the end of the week, sometimes it's just a really hard week and, I don't want to see any kids anymore....I guess that would be the struggle: How much time do I give to my kids but still go home and maintain the rest of my life as not a teacher.</i> (Teachers)</p>
<p><b>Identifying appropriate long-term assessments of SLA's impact.</b> Standardized test scores are the most readily-available outcomes for assessing school performance. SLA is at a disadvantage in comparison to other schools because it does not rely on testing as a primary basis of assessment and students have less familiarity with testing.</p> <p>RFA's class of 2010 brief is a first step toward identifying and assessing appropriate outcome measures as it looks at graduates adjustment to college and reflections on their SLA experience.</p> <p>The adjacent quotes point to other outcomes we heard students describe. Further research should explore these outcomes in more depth.</p>	<p><i>I want them [SLA students] to be thoughtful, wise, passionate and kind. If you can figure out how to measure that I will be really happy.</i> (Principal)</p> <p>Outcomes described by current seniors and alumni in focus groups.</p> <p><b>Critical thinking:</b> <i>I have really good reasoning skills as a result of studying at SLA. Specifically [I'm a] better writer, better thinker, and more analytical and reflective person afterward.</i> (Alumni)</p> <p><b>Confidence:</b> <i>I learned here to voice my opinion, to not let anybody shut you down.</i> (Alumni)</p> <p><b>Career development:</b> <i>I think SLA helps you find which way you want to go. It makes you want to shoot further than what most people would be...I feel like a lot of the kids in the school are well directed.</i> (Senior)</p> <p><b>Tolerance:</b> <i>I'm more accepting now, way more. Ninth grade, I probably was very uncomfortable.</i> (Alumni)</p>

## Conclusions and Recommendations

RFA's data suggests that SLA is STEM-rich, caring, collegial and instructionally-coherent high school which aims to prepare students not only for college but also more holistically, as citizens. Further research, with broader samples of SLA teachers, students and parents could strengthen the evidence for and understanding of the ways in which SLA creates these conditions for learning and healthy adolescent development. The study also identifies a set of challenges for SLA to consider including the alignment of their curriculum with college environments, particularly in STEM fields, more supports for teachers as they learn to use an inquiry-driven approach, and for teachers and administrators as they manage the demands of working in a small high school. In addition, more research with comparison groups of students from other magnet schools is needed to assess the more holistic set of outcomes SLA is designed to achieve in the short-term and long-term.

The enabling conditions described above are important to attend to in any efforts to replicate SLA as well as to sustain the current school model. Considering these enabling conditions, we recommend particular attention to the following issues:

**Developing additional school leaders.** Principal leadership is central to the success of any school and even while leadership is successfully distributed at SLA, the talents of the founding principal remain essential to the SLA's success. TFI & SLA may consider developing a succession plan to provide continuity for any future leadership transition.

**Maintaining a pool of high quality teachers.** The hiring of staff committed to the vision of the school is also a key component of the school's success. TFI and SLA should work to ensure that SLA continues to have access to a pool of high quality teachers. In recent years, a hiring freeze in the SDP has limited the pool for hiring to teachers already in the existing system.

**Strengthening the TFI Partnership.** The TFI partnership is unique and significant for SLA as it navigates the sometimes turbulent environment of the Philadelphia School District. However, the programmatic potential of the partnership has not yet been realized and should continue to receive focused attention. The hiring of a liaison facilitate the programmatic partnership appears to be a step in the right direction. The TFI-SLA partnership has the potential to be instructive to schools and science museums around the country and its progress should also continue to be documented.

**Continue to strengthen and support the transition to college of SLA students.** SLA has learned lessons about what it takes to help SLA graduates successfully transition to college. Given the unique pedagogical approach of SLA, which is not found in many college campuses, SLA should continue to monitor alumni experiences and progress in college and cultivate relationships with colleges and universities that have closer alignment to the SLA vision.

## Appendix A. Qualitative Methodology

Focus groups and interviews were conducted with a total of 62 individuals connected with SLA. Interviews were conducted between June and November 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. Interview participants**

Participants	Number of interviews
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
<b>Total</b>	<b>62</b>

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. Interview themes and codes**

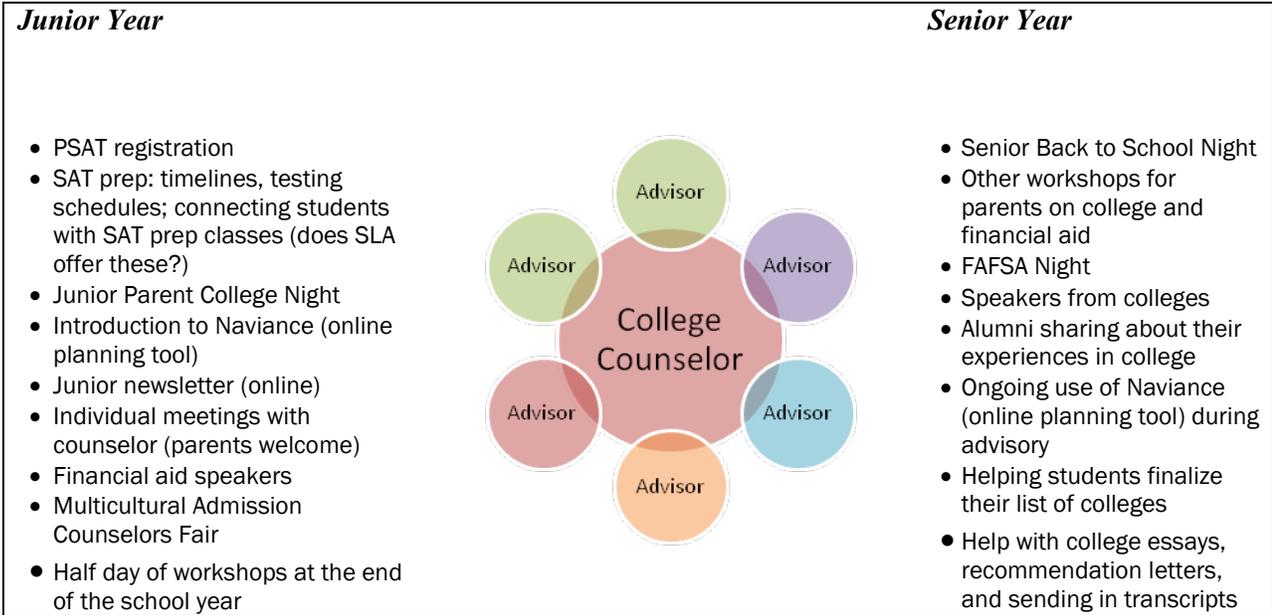
Code family	Codes
<b>TFI Partnership</b>	Partnership goals Partnership activities & staffing Communication/collaboration Challenges in partnership Benefits of partnership
<b>Leadership &amp; Staffing</b>	Principal leadership/role Teachers & teacher leadership Teacher support & evaluation
<b>Elements of Instructional Model</b>	Advisories Technology PBL & Inquiry-based learning Curriculum Planning & Assessment EduCon ILPs

	<p>Capstones STEM classes/experiences</p>
<b>School Climate</b>	<p>Caring environment Student Voice Physical appearance Messages Parent/community</p>
<b>Post-Secondary prep and experiences</b>	<p>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</p>
<b>Other</b>	<p>Additional resources/fundraising Admissions process High school Transition Class of 2010</p>

**Appendix B. Examples of SLA Supports and Opportunities**

SLA offers a variety of supports during junior and senior year to assist students and parents with college applications and financial aid.

**Figure 1B. Student/parent supports**



## Figure 2B. Examples of SLA ILPs

### Examples of SLA Independent Learning Projects for 10th and 11th grade students

*So, my child was lucky enough to get to work at the Mutter Museum, and he liked it so much that he then trained to be a docent, and so he was a docent at the Mutter Museum this summer. (Parent)*

*I would say my ILP at the zoo definitely helped me, because it gave me more presentation skills, so I was more comfortable around big groups, because I was talking on a stage in front of like 50 people. (Student)*

*Actually, one of the things that I appreciate about my daughter's ILP last year, for a long time, she thought she wanted to go into architectural engineering, but actually doing her ILP at an architecture firm helped her realize that that's not what she wanted to do. (Parent)*

*Her ILP, she was going to Drexel. I thought that was really good experience for her, to go to a college, get some experience with college, going there. (Parent)*

*He looks at the Franklin Institute as an extension of his school. He has been lucky enough to have an internship there...He was with the design team and he got to work on the new electricity display. It was great. (Parent)*

*I did music video production at Drexel. I had quite a bit of fun there. (Student)*

*I did the entrepreneurial class. I cofounded a nonprofit. (Student)*

*And then last year I took a course at UPenn through their Young Scholars program. Calculus BC, which isn't offered here. (Student)*

*My first year, I worked at the Academy of Natural Sciences with their internship program. I lived in the live animal center, so I took care of the animals and cleaned up after them. (Student)*

*For my second ILP I was working for my family dentist, helping clean teeth and bringing materials and stuff. (Student)*

*My ILP for both years was, I was a personal assistant for a nonprofit HIV/AIDS center. (Student)*

*Tenth grade I did Arabic drumming. (Student)*

*I think my second ILP actually helped me. I went into debate, because I was interested in law. And I was trying to think, how good am I at presenting an argument and standing against someone else? I'm actually really good at it, but I realized I can't focus on the facts. I like focusing on the logic that I'm arguing. I realized I like arguing, and coming up with arguments, and discussing topics. (Student)*

*I took two semesters of math at Penn, and this year I'm taking another - a few other classes there. That's really going to help me get into college, and when I get there. I'm really interested in math, so it's helped me really push what I'm interested in, and learn a lot more about it. (Student)*

### Figure 3B. Quotes about Senior Capstone Projects

#### Examples of Senior Capstone Projects

*My daughter last year, she was a digital video student, that was her area of interest, and she made a 5-minute movie. (Parent)*

*My capstone is sort of like a spinoff of my ILP... I use the basketball team, because they're athletes, because I don't want to just give anybody a weight supplement. My mentor is my friend's dad's personal trainer; he's in the NBA. So I get a lot of workouts and stuff from him. So I basically just mimic everything. And I used it on myself, too, and after a month or so, I will measure waistband, muscle mass. Because they've got a special scale. So, that's how I do it. (Student)*

*My capstone is that I wanted to have a non-profit organization to help benefit women and their children that are in homeless shelters, and give job training, and exercise-that's what I wanted to do, help their inside and the outside, because they were in shelters. And that's something that I'm passionate about. And I teamed up with CHOP's homeless health initiative. (Student)*

*My capstone is, I'm making a documentary about bullying and about how martial arts can give you confidence to have the bullying cease. So, I'm trying to find an elementary school where kids are being bullied, and interview people who have been bullied, interview people who are martial artists-because I'm a karate teacher. Putting the two together, because I'm really passionate about it. (Student)*

*Myself and two other students wrote and directed one-act plays for the "annual" SLA play...that was my capstone. (Student)*

*It was about Neurology. I was studying the history of neurology and then interviewing a neurologist at CHOP and then creating a presentation by collecting MRI images of the brain and writing about them. (Student)*

*And then we have a group of students that started working with Derrick Pitts this year, working on a solar observing, photo-taking project. There's three of them, and they plan to work on this next year. And I'm sure one of them is going to be working on his capstone with us in two years in this project. (Student)*