Evaluation of the Verdugo School-to-Career Partnership:

PLUS Evaluation of Clark Magnet High School

Glendale Unified School District

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Executive Summary

This report contains an analysis of data collected by Public *Works,* Inc. under contract to the Verdugo School-to-Career Partnership as part of the State of California's Case Study Evaluation of School-to-Career implementation. Verdugo is one of thirteen partnerships participating in this evaluation and includes schools in the Glendale, Burbank and La Cañada school districts. The Case Study Evaluation has been conducted under the leadership of WestEd in San Francisco and MPR Associates, Inc. in Berkeley, California.

The Case Study Evaluation was divided into two parts: the **CORE** and the **PLUS** evaluation studies. The CORE evaluation focus focused on status of STC statewide by using the same evaluation protocols, instruments and strategies in the thirteen partnerships participating in the statewide evaluation[1]. All partnerships focused on the same statewide key research questions:

1. What is the status of STC implementation in California?
2. How has STC affected student preparation for postsecondary education and career entry?
3. To what degree and in what ways has STC contributed to systemic change?
4. Have STC principles penetrated the community deeply enough to be sustainable?

The PLUS evaluation allowed partnerships to design their own evaluation studies from to evaluate more intense school-to-career efforts within their partnership or at particular schools. This report contains the results of the Verdugo PLUS evaluation study, which consists of examining the School-to-Career (STC) program in place at Clark Magnet High School, a comprehensive high school organized around STC principles located in the Glendale Unified School District (GUSD).

Opened to relieve overcrowding at the other three GUSD high schools, Clark was designed to function as a specialized magnet focused on science and technology. In creating the vision for the school, District and community stakeholders developed a vision for Clark as a school that would exemplify STC principles through thematic and project-based learning instructional approaches as part of the science and technology core curriculum. The educational vision for Clark also emphasized student exposure to adults working in science and technology careers through regular career assemblies as well as opportunities for participation in job shadowing and internships.

Evaluation Methods

The Verdugo STC PLUS study focused specifically on whether or not participation at Clark Magnet results improved student performance through the use of both quantitative and qualitative methods. In order to collect information on the STC organization and programmatic elements in place at Clark Magnet High School, the evaluation team conducted an initial and a follow-up site visit interviewing a wide variety of stakeholders involved in the school. The PLUS study also involved a Senior Survey (comparing Clark

[1] Results of the Verdugo Partnership's CORE Evaluation Study is available from the Department of Education, the Verdugo Partnership or directly from Public *Works,* Inc.

student respondents to other GUSD students while in high school) and a Follow-up Survey with graduates in the Fall. In addition, Public *Works,* Inc. conducted the analysis of student outcome data (compare Clark students to a control group of non-STC students at other GUSD high schools) both descriptively and using multivariate (regression) analytic techniques.

This study compares the performance of Clark students to demographically similar GUSD high school students not participating in STC programs while in high school. Because attendance at Clark is voluntary and the application process to enter the school is competitive, it was necessary to "control" for factors that may have an impact on student achievement apart from the influence of STC participation. In essence, the PLUS study aims to estimate the effect of STC participation, while controlling for student demographics and prior academic achievement in order to take into account any "self-selection" bias that may exist with regard to enrollment in Clark Magnet.

Key Findings

Based on a review of the relevant literature regarding the success of career academies, a typical STC organizational strategy, and in improving key measures of student achievement. The research reviewed associated STC participation with the following student outcomes:

- Lower dropout rates
- Improved attendance rates
- Increased academic course taking
- Greater likelihood of earning course credits leading to on-time graduation
- Improved GPA

The descriptive and regression analyses presented in this report support some (but not all) of these conclusions about the academic benefits of participation in in-depth STC experiences while in high school. The data analyses presented in this report provide validation for offering the following these conclusions about the benefits of participation in in-depth STC experiences while in high school.

Conclusion 1: Attendance at Clark is associated with improved student outcomes.

Compared to a control group of GUSD students not involved in extensive STC programs, students at Clark Magnet High School were more likely to accumulate course credits leading to graduation and to complete higher-level math courses leading to postsecondary eligibility. Clark students also tended to remain in school, with no dropouts recorded for the school in the last two years for which data are available.

Unlike previous research studies which have not linked improved standardized math and reading achievement test scores to STC participation, the results of this study indicate that Clark students scored better than the control group students on Stanford 9 Math after controlling for demographic and prior achievement factors. These strong math results are likely linked to the school's eligibility requirements which require students to enter the school ready to enroll in Algebra or a higher level mathematics course. Nonetheless, the

correlation between enrollment at Clark and Stanford 9 mathematics scores was statistically significant even after controlling for demographic characteristics that might be associated with higher test scores and 9th grade math achievement. This, in turn, suggests that curricular experiences which involve students in hands-on applications of mathematical reasoning during science courses and technology electives may have spillover benefits for student math achievement.

However, the fact that Stanford 9 Science scores were not higher among students at a magnet school specializing in science and technology suggests that the influence of STC principles is not generalizable across academic content areas. We are therefore reticent to attribute the gains in standardized test scores to the curricular experience at Clark.

Conclusion 2: The curricular program at Clark provides students with access to increased opportunities for school- and work-based STC experiences than the overall District.

Clark's curricular program and organizational structure provide time for students to participate in project-based learning and career exploration, particularly during academic electives. Block scheduling reinforces school-based STC experiences by allowing students more time for hands-on applications of academic concepts. This schedule is not used at any other GUSD high school.

Regular exposure to outside speakers at Clark as well as the promotion of opportunities for students to participate in job shadowing and internships serve to promote STC goals of postsecondary and career preparation while making learning more relevant and fun for students at Clark. The requirement for a Senior Project (unique to Clark in GUSD) also provides a culminating experience for students that encourage both career exploration and the application of hands-on, project-based learning. In addition, graduation requirements at Clark (e.g., service learning and Senior Project) increase the likelihood of students participating in career exploration and work-based STC experiences. No other GUSD school requires a Senior Project.

Conclusion 3: Clark's implementation of STC encourages preparation for postsecondary education.

The emphasis on providing students with access to school- and work-based STC experiences at Clark has gone hand-in-hand with an emphasis on postsecondary education. This is clearest in the follow-up survey data gathered from graduated seniors. Former Clark students were much more likely to enroll full-time in four-year colleges and universities compared to other GUSD students not involved in in-depth STC experiences while in high school. Despite indications that college preparation is emphasized at all GUSD high schools, graduates of Clark were much more likely to indicate intentions to obtain a baccalaureate or other advanced degree compared to students participating in regular comprehensive high school program in GUSD.

Conclusion 4: Most STC components are embedded into the curricular program at Clark, but not always evident to students.

Although Clark appears to be firmly grounded in STC principles, the majority of Clark's students do not connect the school's programs, activities and curricular focus to STC components. This is most clear in student survey results which indicate that students do not identify with the STC "label" even when queried about participation in specific STC components. When STC is explained in more detail, students in interviews agreed that STC is present at the school (primarily in academic electives and extracurricular activities) but admitted that core academic classes do not sufficiently reinforce STC linkages and connections as a part of the regular curriculum. Instead, students experienced STC elements during elective courses aimed at promoting hands-on applications of science, math and technological skills. In sum, there is limited evidence of overt STC curricular integration at Clark.

It appears that Clark has infused STC into the high school experience of its students without raising the profile of STC as a deliberate reform strategy, at least with the initial cohorts of students attending the school. Indeed, the results of the student surveys seem to indicate that most students did not feel that their high school experience involved exposure to STC programs and activities nor were the student survey respondents likely to identify benefits of participation in STC activities and programs. Moreover, student interviewees tended to say that they (and their parents) identified with the school's magnet label. Students attributed success in school to the nurturing learning environment provided by caring teachers. Students also said that they were motivated to come to school by access to state-of-the-art technology.

Conclusion 5: Perceptions that Clark is not representative of GUSD may limit receptivity and extension of support for STC at other GUSD campuses.

The context for this evaluation derived, in part, from a desire to examine the degree to which Clark Magnet High School has been effective in improving student achievement using STC as a reform strategy. From the outset, the evaluation team was informed that some personnel at other GUSD schools attributed Clark's success to student demographic factors rather than the school's curricular program. As part of this study, the evaluation attempted to control for the school's demographic differences by selecting a control group of students similar to the student composition of the first two cohorts of students attending Clark. Compared to the control group, Clark students should positive outcomes in terms of coursetaking patterns, math test scores and postsecondary aspirations (see Conclusion 1). Nonetheless, the fact remains that Clark's student demographics depart from that of GUSD as a whole, leaving the school open to criticism regardless of the research findings. In particular, females and Hispanic/Latino students are underrepresented at Clark as well as LEP student subgroups. To some extent, these demographic characteristics may reflect the anomalous nature of the initial cohorts of students attending the school. Indeed, there is evidence that the school is consciously aware of the gender imbalance issues and has done a better job of attracting female students. While it is beyond the scope of this evaluation report to examine these issues in detail, we recommend that Clark, in conjunction with GUSD, carefully examine the school's student eligibility requirements and recruitment practices with an eye toward making Clark more representative of GUSD.

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1. Introduction

Passed by Congress in 1994, the School-to-Work Opportunities Act (STWOA) initiated an educational reform movement that aims to better prepare students for postsecondary education and career entry. School-to-career efforts have been supported nation wide through the development of regional local partnership that aim to better link the K-12 educational system with local community colleges, other postsecondary institutions and work-based learning programs and with local employers.

STWOA has provided support for educational reform efforts within schools that attempt to change the traditional focus on isolated academic learning to an educational experience that allows learning to take place in context. These educational techniques include reorganizing high school programs under broad industry or student career interest areas, hands-on applications of academic course material and the integration of project-based demonstrations of student learning. Another key aspect of STC focuses on providing students with opportunities to learn more about careers through access to adult mentors and role models through career-oriented guest speakers, job shadowing, and internships.

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The Case Study Evaluation was divided into two parts: the **CORE** and the **PLUS** evaluation studies. The CORE evaluation focus focused on status of STC statewide by using the same evaluation protocols, instruments and strategies in the thirteen partnerships participating in the statewide evaluation[1]. All partnerships focused on the same statewide key research questions:

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The PLUS evaluation allowed partnerships to design their own evaluation studies from to evaluate more intense school-to-career efforts within their partnership or at particular schools. On behalf of the Verdugo Partnership, Public *Works,* Inc. also participated in the PLUS study for the state. This report contains the results of the Verdugo PLUS evaluation study, which consists of examining the School-to-Career (STC) program in place at Clark Magnet High School, a comprehensive high school organized around STC principles located in the Glendale Unified School District (GUSD).

[1] Results of the Verdugo Partnership's CORE Evaluation Study is available from the Department of Education, the Verdugo Partnership or directly from Public *Works,* Inc.

The Verdugo STC PLUS study focused specifically on whether or not participation in an in-depth STC experience results in improved student performance. To answer this question, this study compares the performance of Clark students to demographically similar GUSD high school students not participating in STC programs while in high school. Because attendance at Clark is voluntary and the application process to enter the school is competitive, it was necessary to "control" for factors that may have an impact on student achievement apart from the influence of STC participation. In essence, the PLUS study aims to estimate the effect of STC participation, while controlling for student demographics and prior academic achievement in order to take into account any "self-selection" bias that may exist with regard to enrollment in Clark Magnet.

Opened to relieve overcrowding at the other three GUSD high schools, Clark was designed to function as a specialized magnet focused on science and technology. In creating the vision for the school, District and community stakeholders developed a vision for Clark as a school that would exemplify STC principles through thematic and project-based learning instructional approaches as part of the science and technology core curriculum. The educational vision for Clark also emphasized student exposure to adults working in science and technology careers through regular career assemblies as well as opportunities for participation in job shadowing and internships.

Clark Magnet High School began operation in September of 1998. Clark enrolls eligible students through a lottery process. Clark is open to all GUSD students who meet the following:

- 2.0 GPA average for the 7th & 8th grades
- Good citizenship and attendance record
- Prepared to enter into Algebra (or take Introduction to Algebra, or equivalent, during the Summer prior to enrollment)

While student selection is done by a lottery, it is not a completely random process. Instead, the lottery is conducted in such a way to attempt to keep the proportions of students from each potential comprehensive high school equal. In other words, Clark's lottery intends to recruit an approximately equal number of students who would have otherwise attended Glendale, Hoover, or Crescenta Valley High School. This is in keeping with the fact that Clark was opened as a high school, in part, to relieve District overcrowding.

This study's overriding purpose is to assess the effect of participating in an extensive STC program by comparing the academic performance of the first cohorts of students attending Clark to a sample of GUSD high school students with similar demographic characteristics who were not involved in an extensive STC program. This study builds on research that has been conducted which examines the impact of participation in key STC programmatic strategies on student performance. In particular, the PLUS study of Clark Magnet seeks to examine whether and how participation in a specialized magnet school organized around STC principles results in measurable benefits to student achievement and/or preparation for postsecondary education and careers. Our evaluation emphasizes the analysis of quantitative data and includes a targeted collection of qualitative data that contextualizes the quantitative findings.

Report Organization

The report is organized into the following sections:

- Review of relevant literature
- Analytic approach and methods
- Qualitative research findings
- Student survey research findings
- Student outcome findings
- Interpretation of results and findings

In addition, several appendices are attached. They include:

- Site visit interview guides
- Tables of student survey results (Spring CORE and Senior Follow-Up)
- Tables of student outcome data (descriptive statistics)
- Tables of student outcome data (regression analyses)
- Bibliography

Review of Relevant Literature

Although Clark Magnet High School functions as a stand-alone comprehensive high school, its organizational principles and core educational philosophy have clearly been influenced by the School-to Career (STC) movement. While not an "occupational" high school in the traditional sense, Clark's organization as a math, science, and technology magnet high school has endowed the school with a strong STC orientation. Indeed, Clark shares many of the characteristics of career academies, one of the oldest and well-documented strategies for reorganizing education that fall under the broad umbrella of STC reforms. While other GUSD high schools offer career academy programs, Clark is the only school-wide STC option for students. Clark serves as an STC-oriented "school-within-a-district" as opposed to the more common school-within-a-school orientation of career academies. Nonetheless, the literature on the effectiveness of career academies helps illuminate how and why STC might be expected to influence student performance outcomes.

Generally organized as a school-within-a-school, career academies provide students with a smaller, more personal learning experience, career focused academic and vocational curricula, and partnerships with employers that provide career awareness and work-based learning opportunities. Career academies have a long track record (30 years) and exist in over 1,500 high schools (Kemple and Snipes, 2000).

One of the most extensive studies of career academies is the 10-Year Career Academies Evaluation conducted by the Manpower Demonstration Research Corporation (MDRC). Entitled *Career Academies, Impacts on Students' Engagement and Performance in High School,* this March 2000 report is unique in its use of a random assignment research design that determined the impact of Career Academies on student outcomes by tracking their performance of 1700 students (both academy and non-academy) through high school in 10 sites across the nation (Kemple and Snipes, 2000).

Based on prior school experiences and background characteristics, about one quarter of the students were classified as the "high-risk," another quarter were classified as "low-risk" and the remaining half of the sample was classified as "medium-risk." of students. With these categories in mind, key findings from the study included:

- An increased level of interpersonal support for students in career academies as well as an increase in their participation in career awareness and work-based learning activities.
- For the "high-risk" subgroup, the impact of the career academy was particularly important. "High-risk" students had lower dropout rates, improved attendance, increased academic course-taking, and an increase in the likelihood of earning enough credits to graduate on time.
- For the "low-risk" subgroup, the impact of the career academy was also positive. Among, these students, there was an increased likelihood of on-time graduation and an increase in the number of vocational courses taken without reducing the likelihood of completing a basic core academic curriculum.
- In the career academies that focused efforts on enhancing interpersonal support from teachers and peers, the study found reduced dropout rates and improved school engagement for both the "medium-risk" and "high-risk" subgroups. Without these supports, student dropout rates were higher and student engagement was lower.

Despite these positive findings associated with career academies, the study did not find improve standardized math and reading achievement test scores among academy students. Indeed, it is difficult to link the curricular changes implied under the career academy STC approach to changes in core achievement competencies of the kind measured by standardized norm-referenced tests. In addition, most standardized norm-referenced tests are administered before the intervention takes place—9th or 10th grade. Most career academies begin at 9th grade.

Although previous studies have not made definitive connections between STC participation and improved student outcomes on standardized tests, this study does examine whether or not there are statistically significant differences in the Stanford 9 scores of the intervention group of Clark students compared to a control group of GUSD non-STC participants. Clark is a 9th through 12th grade magnet school.

Additional information on the relationship between career academy participation and student outcomes is documented by the California Partnership Academies. In the most recently available state evaluation of California Partnership Academies, which covers data from 1992-93 through 1995-96, several important findings contribute to the overall picture of consistent success that emerges from California Partnership Academies including:

(1) Across all programs, attendance rates and the number of credits achieved show slight but consistent improvement across each of the four years included in the evaluation.
(2) The average dropout rate for all four years is consistently below the statewide rate.
(3) While there is little follow up data once students have graduated from the academy, student interest in postsecondary education is high with 75%-88% of academy students reported their intention to enroll in a postsecondary program (typically a two-year community college) after graduation.

In another study of the California Partnership Academies conducted by Foothill Associates, other positive student outcomes were identified including (1997):

- Academy student attendance was impressive—95.4 percent of academy students had attendance of 80 percent or better and 81.8 percent of students had attendance of 90 percent or better).
- When students are tracked over time, there is a substantial jump in performance between grades 9 and 10 (when students enroll in the Academy). Attendance, credits earned, and GPA all showed strong positive effects. While improvements in grades 11 and 12 were smaller, upward trends continued.

While the MDRC and California Partnership Academies evaluations contain the most specific information a summative evaluation conducted for the Illinois Board of Education covering 1993-1997 showed promising attendance rates and credits earned toward graduation among career academy students (Illinois State Board of Education, 1997). On a more local level, a study of the Transportation Career Academy programs in the Los Angeles Unified School District (LAUSD) found similar results. When compared with students in the general student population, the research noted statistically significant increase in GPA, course credits earned, and attendance (Hanser, 1998). In addition, a study of LAUSD New Media academies conducted by RAND concluded that academy students had better than or equal GPAs, credits earned, and attendance rates compared to students in the regular academic program or magnet programs offered in comparison schools (Hanser, 2000).

In sum, previous research on career academies has established some linkages between student participation in STC programs and activities and key student outcome measures. Based on our evaluation design and the analytic methods used for the Verdugo PLUS study, we investigate whether or not some or all of the impacts cited in the STC literature apply to the students at Clark Magnet High School.

2. Analytic Approach and Methods

The PLUS Study focused on analyzing the effect of participating in Clark Magnet High School on student achievement using a variety of qualitative and quantitative research methods. Qualitative information was collected through two site visits to Clark Magnet High School. The site visits included interviews and focus groups with teachers, administrators, counselors, students and the STC coordinator. In addition to the qualitative information collected through the site visit, the PLUS study examined a comparison of student outcome data from a sample of students at Clark Magnet and the two other comprehensive high schools in GUSD, Glendale High and Crescenta Valley (for example SAT9 test scores, attendance rates and postsecondary eligibility). And finally, the PLUS study compared the results of a survey of students at Clark Magnet, Glendale High and Crescenta Valley conducted in the spring of 2001 and a follow up survey conducted in the fall of 2001 under the CORE case study.

Qualitative Research Design

In order to collect qualitative information on the STC organization and programmatic elements in place at Clark, the evaluation team conducted an initial and a follow-up site visit at Clark Magnet High School. During the initial site visits in May and June 2001, interviews and focus groups were held over the course of three days with the following individuals:

Stakeholder Group	Size of Group	Descriptive Information
Students	8	9th graders
Students	9	10th and 11th graders
Students	7	12th graders
Teachers	5	English (1), Social Studies (1), Math (2), Science (1)
Teachers	5	Science (2), Math (1), English (1), Social Studies (1)
Teachers	5	CAD (1), Business (1), Technology (1), Science (1), Math (1)
Administrators	2	Principal and Assistant Principal
STC Coordinator	1	
Counselors	2	
Librarian/Multimedia Lab	1	

Qualitative data collection focused on the following categories of information (interview and focus group protocols used during the site visit can be found in Appendix A):

- School organization
- Student recruitment
- STC staffing
- School-based STC activities (e.g., project-based learning, integration of academic and vocational education, etc.)

- Work-based STC activities (career exploration, participation in job shadowing and internships, etc.)
- Support and partnerships with employers, community, and higher education
- Sustainability of STC efforts

In November 2001, a follow-up interview was held with the school's STC coordinator, both school administrators, and the school librarian. The follow-up site visit was used to clarify certain details from the initial visit and to collect an update on previously gathered information.

The visits at Clark were augmented by site visits conducted at the two GUSD high schools selected for participation in the State's CORE STC projects. Staff from Public Works, Inc. conducted one-day site visits at Crescenta Valley and Glendale high schools in October and November 2001. At these schools, members of the evaluation team met with the following interview and focus group respondents:

School	Stakeholder Group	Size of Group	Descriptive Information
Crescenta Valley	Students	5	12th graders
	Teachers	11	English (3), Social Studies (2), Math (2), Science (1), Visual Arts (1), Special Education (2)
	Administrators	1	Co-Principal
	STC Coordinator	2	Current and former personne1
	Counselors	2	
Glendale	Students	9	12th graders
	Teachers	8	English (1), Math (1), Science (1), Health (2) Work Experience (1), Physical Education (1) Construction Academy (1)
	Administrators	2	Co-Principals
	STC Coordinator	1	
	Counselors	2	

Interviews and focus groups with stakeholders at Crescenta Valley and Glendale were conducted, in part, to provide a comparison point for qualitative data collected at Clark. In particular, we wanted to collect information on how STC was being reinforced and supported at GUSD's comprehensive high schools.

Quantitative Research Design

The PLUS study involved two quantitative data collection and analysis strategies:

1. Student survey (compare Clark student respondents to other seniors surveyed in GUSD as part of the CORE study)
2. Student outcome data (compare Clark students to a control group of non-STC GUSD students)

Survey Administration and Analysis – CORE Survey

In the Spring 2001, all juniors and seniors at Clark Magnet and a random sample of approximately 150 seniors from Crescenta Valley and Glendale High Schools were surveyed. This survey was conducted in conjunction with the CORE case study, which involved twelve other partnerships throughout the state. The senior survey included questions related to the following topics:

- Participation in career-related activities and enrollment in career-focused programs such as career pathways;
- Opinions about participation in career-related activities and programs;
- Opinions about their preparation for careers and further education and training; and
- Future plans.

For the CORE Senior Student Survey, conducted during Spring 2001, students were selected using a two-stage, stratified probability sample design with schools as the first-stage units and students within schools as the second-stage units. As part of the original Request for Application (RFA) process for the CORE study, the Verdugo partnership and Public *Works,* Inc. prepared a list of all high schools in the local partnership. These schools were classified into strata ("High" or "Other") by the evaluators according to the extent of STC activities. Potential PLUS schools were the same as "High" in terms of their STC activities (for example, Clark Magnet). Schools were then selected within each stratum with disproportionate probabilities in order to ensure that the CORE evaluation would be able to examine differences among students with differing exposure to STC activities. Within each school, the students were classified separately into "high intensity" and "other" STC intensity levels. "High" intensity was defined as participation in a career academy, a career pathway or a Tech-Prep program. Each local partnership evaluator was asked to sample randomly approximately 150 seniors in each school, and to over sample "High" intensity seniors in order to provide enough cases for statistical analyses.

The CORE STC survey was administered to three of the four GUSD high schools selected by the State for participation in the Statewide STC evaluation: Glendale, Crescenta Valley and Clark Magnet. In order to generate the random sample of students at Glendale and Crescenta Valley high schools, Public *Works,* Inc. requested a roster of seniors from both schools. On-site STC coordinators were asked to identify students involved in extensive STC experiences (i.e., participation in a designated career academy). For instance, Glendale High School has a Cosmetology Academy and a Construction Academy. Crescenta Valley High School has a Science and Medicine Academy. Using these guidelines, school-based coordinators coded Academy and pathway students as "High" STC students. High" STC students were deliberately over sampled at Glendale and

Crescenta Valley. Indeed, all "High" STC students were included in the CORE survey administration in order to ensure that students known to be participating in STC experiences were included in the analysis. The remaining students were selected randomly from the student roster to reach a total of 150 students included in the sample from each school.

All students at Clark were considered to be "High" students but are referred to throughout the study as "PLUS" students in order to facilitate comparisons to students at the other two high schools.[2] Because of the small overall class size, all 128 12th grade and all 268 11th grade students from Clark were surveyed (i.e., no sampling employed). At the other two high schools (Glendale and Crescenta Valley) a random sample of 150 12th grade students was selected to participate in the CORE survey. Of the 428 surveys administered, a total of 371 surveys were completed, representing an overall response rate of 86.6% (see Table 2.1 below).

Table 2.1: CORE Survey Respondents

School	Number of Seniors/Juniors			Number in Sample			Number Completed Surveys			Response Rate		
	#HI	#Other	Total	#HI	#Other	Total	#HI	#Other	Total	#HI	#Other	Total
Clark (11th grade)	268	n.a.	268	268	n.a.	268	237	n.a.	237	88.4	n.a.	88.4
Clark (12th grade)	128	n.a.	128	128	n.a.	128	123	n.a.	123	96.1	n.a.	96.1
Glendale	28	703	731	28	122	150	16	112	128	57.1	91.8	85.3
Crescenta Valley	17	549	566	17	133	150	11	109	120	64.7	82.0	80.0
TOTAL	**441**	**1252**	**1693**	**441**	**255**	**696**	**387**	**221**	**608**	**87.4**	**86.6**	**87.8**

For comparison purposes, survey analyses focused on comparing Clark 11th and 12th grade responses to the survey with the CORE 12th graders. The CORE sample of non-Clark survey respondents was further subdivided into "High" STC respondents (Glendale and Crescenta Valley seniors involved in career academy programs) and "Other" respondents (seniors not involved in any in-depth STC experience while in high school).[3] For complete survey results, please refer to tables in Appendix B.

Survey Administration and Analysis – Follow Up Survey

In the Fall of 2001, Public Works, Inc. used information supplied by the students to contact every senior who responded to the spring Senior survey from Clark, Glendale and Crescenta Valley. No additional sampling was conducted for the Follow-up Survey. The follow-up survey included questions on the following topics:

[2] Note that Appendix B labels all Clark respondents as "PLUS" students to facilitate comparisons to "High" and "Other" students at Glendale and Crescenta Valley.

[3] Although analysis weights were applied to account for the sampling design for the entire Verdugo STC Partnership in the CORE analysis, analytic weights were not calculated separately for the three GUSD schools included in the PLUS analyses. The CORE analysis includes schools from two additional districts in the Partnership.

- Postsecondary enrollment
- Post high school employment information
- Opinions about high school experiences
- Future plans

For the follow-up survey, Public *Works,* Inc. used a tear-off form that was part of the original Senior Survey to contact the original respondents. The form asked students to provide their mailing address, email address, telephone number and the names, addresses, telephone numbers, and email addresses for up to two additional contacts who were likely to know the students' whereabouts in Fall 2001.

Seniors who had completed the Senior Survey were re-contacted via telephone and asked to participate in the Follow-up Survey. Of the 371 Follow-up Surveys administered to seniors, 261 were completed, representing an overall response rate of 70.4% (see Table 2.2 below). For complete follow-up survey results, please refer to tables in Appendix B.

Table 2.2: Follow Up Survey Respondents[4]

School	Number of Seniors Completing Spring Survey	Number Completed Follow-Up Surveys	Response Rate
Clark	123	92	75.0
Glendale	128	85	66.4
Crescenta Valley	120	84	70.0
Total	**371**	**261**	**70.4**

Data Collection Methods

In July 2001, following the finalization of data records for the 2000-2001 school year, Public Works, Inc. requested student level data from GUSD for this study. Student data on the entire senior and junior class at Clark were requested along with a similar database for Glendale, Hoover, and Crescenta Valley High Schools. Student level data were obtained for all of the indicators included in the regression model (see below). In addition, GUSD provided District-wide data linked to Golden State exams.

Some additional "screening" of the data was done to ensure completeness of the data included in the study. Records were eliminated if the student did not have three years of Stanford 9 data. Another data limitation involved GUSD's provision of data for 12th grade

[4] As shown in the table above, one school (Glendale High School) did not achieve a 70% response rate, which was the target response rate for the follow up survey. In order to investigate the possibility of non-response bias, the responses of these students were examined closely based on demographic and gender distribution. We also examined the survey data by comparing the responses of the follow-up survey respondents to non-respondents on the original survey. In addition, chi-square tests were performed in order to ascertain if any differences were of statistical significance. In this comparison, there were no statistically significant differences between respondents and non-respondents on either demographic questions or survey questions.

graduates. As such, data on 12th grade students did not include records for dropouts among either the intervention (Clark) or control group samples. School-wide dropout rates were instead obtained from the CBEDS database.

In obtaining student-level data, we maintained strict confidentiality protocols that were agreed upon by GUSD and Public *Works,* Inc. All data was received without student name, consisting of a District-generated student identification number attached to each student record. Data was not linked to individual student names and confidentiality was maintained at all times. Because names were not released, according to District protocols, a letter to parents to obtain approval for inclusion in the PLUS study was not necessary. At the same time, the protocols on confidentiality prevented us from linking outcome data received from GUSD to the individual student survey data. Data were received in electronic ACSII format and imported into SPSS for analysis.

Sampling Approach

It is important to note that the demographic characteristics of the Clark students (grades 9-12) in 2000-2001 differ markedly from GUSD as a whole (Table 2.3).

Table 2.3: 2000-2001 Demographic Characteristics (%), Clark Compared to GUSD

Student Characteristic (Grade 11 and 12 only)	Clark (N=399)	GUSD (N=4,856)
Gender		
Female	35.1%	48.7%
Male	64.9%	51.3%
Ethnicity		
African American	0.5%	0.9%
Asian	28.1%	14.1%
Hispanic/Latino	6.8%	18.7%
Filipino/Pacific Islander	5.8%	4.8%
White (non-Hispanic, includes Middle Eastern)	68.2%	61.4%
Limited English Proficient	9.0%	27.2%
Free/Reduced Meal Program Eligibility (All grades)	32.8%	48.4%

Source: California Department of Education

Indeed, as shown in Table 2.3 above, Clark 11th and 12th grade students are more likely to be male. Ethnically, Clark students are more likely to be Asian or White, and much less likely to be Hispanic. In addition, the students at Clark tend to be less likely to be Limited English Proficient (LEP) or eligible for Free/Reduced Meals.

Given the difference between Clark and GUSD, it was important to select an appropriate control group from the potential GUSD population. The control group was selected by first having GUSD staff from the Verdugo STC Partnership identify non-Clark GUSD students participating in career academies at the other three GUSD high schools. These students were eliminated from the possible control group to ensure that the study would be

able to examine achievement differences in terms of the independent variable of interest (STC participation at Clark).

It is important to note that the sampling of non-Clark students drew from all three GUSD high schools despite the fact that only two of these had been included in the CORE study referenced earlier in this report. As such, the control group used in the descriptive and regression analyses of this report differs from the survey analyses which, by design, included only the two non-Clark GUSD high schools selected for participation in the CORE study by the State-wide STC evaluation team.

Public *Works,* Inc. randomly selected a control group from the non-Clark student with at least three years of Stanford 9 data. Because Clark had been created to relieve GUSD high school overcrowding and because the student body at Clark was intended to be drawn in relatively equal proportions from students in the attendance areas of the other three GUSD high schools, the random stratified sample prioritized students' home zip code. In essence, home zip code functioned as a proxy for students' socioeconomic status and, to a limited degree other demographic characteristics such as ethnicity and English language proficiency.

After randomly generating a control group based on home zip code, we examined the "fit" of the control group and then augmented the control group slightly to better approximate the ethnic distribution of students at Clark. In particular, we increased the number of Asian and decreased the number of Hispanic students included in the control group.

As can be seen in Table 2.4 on the next page, compared to the control group of 329 non-STC GUSD 11th and 12th graders in 2000-2001, the 280 Clark 11th and 12th grade students were more likely to be male and slightly less likely to be Hispanic/Latino or LEP. However, the major imbalance between the intervention (Clark) and control group is in gender. In selecting an appropriate control group, we were forced to put less emphasis on gender in order to achieve a comparison group that more closely resembled the first two cohorts of students to attend Clark in terms of socioeconomic status, ethnicity, and English language proficiency. Ultimately, the remaining differences between the two comparison groups were accounted for in the regression analyses which essentially "hold constant" the demographic factors in examining the effect of enrollment at Clark on achievement variables (see Section 4 of this report).

Table 2.4: Demographic Characteristics (%), 11th and 12th Grade Clark Students (Intervention) Compared to Other Non-STC GUSD 11th and 12th Grade Students (Control Group)

	Intervention (Clark) (N=280)	Control Group (N=329)
Home Zip Code		
91020	3.6	3.3
91201	11.1	11.6
91202	11.1	11.2
91203	5.7	6.1
91204	6.8	5.5
91205	14.3	12.8
91206	15.7	15.2
91207	4.3	4.0
91208	8.6	9.4
91214	18.9	21.0
Free/Reduced Meal Program Participation		
Free	21.8	27.4
Reduced	5.4	3.6
Not Eligible	72.9	69.0
Ethnicity		
African American	0.7	0.0
Asian	26.8	21.6
Hispanic/Latino	5.4	8.5
Filipino/Pacific Islander	4.6	4.9
Middle Easterner	42.1	40.7
Caucasian	20.4	23.7
English Language Proficiency		
Limited English Proficient	9.3	14.9
Fluent English Proficient	67.5	60.2
English Only	23.2	24.9
Gender		
Female	34.6	55.9
Male	65.4	44.1

Analysis of Student Outcome Data

As part of the analysis of student data for this report, we conducted both descriptive and regression analyses. Descriptive analyses describe the achievement trends apparent in the data. The results, however, cannot be used to establish or to test whether one variable is related to the other and whether one has an impact on the other. Thus, the descriptive data cannot explain whether participation in an in-depth STC experience has an impact on achievement. Similarly, the descriptive statistics cannot "prove" whether the impact of STC participation on achievement is statistically significant in its own right or bound up in the different characteristics of the students at Clark. In sum, descriptive statistics merely provide a statement of the achievement trends among the Clark (intervention) and control group samples.

In order to determine whether participation in the in-depth STC program at Clark has an impact on student achievement, Public *Works* Inc. compared the achievement of Clark

students to similar students at other three GUSD high schools who have not participated in an in-depth STC program.

The performance of the intervention and control students was compared in a descriptive manner in terms of the following student-level indicator variables:

- Stanford 9 scores (reported as Normal Curve Equivalent[5] scores for Reading, Mathematics, Language, Social Studies, and Science).
- Attendance Rate
- Grade Point Average (cumulative)
- Course credits earned
- Highest math course taken.[6]
- School-wide Dropout Rates[7]

In addition to reporting data for the sample as a whole, we disaggregated outcome data by the following demographic variables:

- Gender
- Race/Ethnicity
- Free/Reduced Meal program eligibility
- English Language proficiency

Description of Regression Models

For the second component of the outcome data analysis we utilized a multiple regression model to isolate the effect that participation at Clark has on the outcomes analyzed above. This method provides regression coefficients that estimate the effect of different variables on the dependent variable (in this case, participation in a career academy). In order to examine whether participation in STC experiences while in high school has a positive effect on student achievement, we estimated the impact of being a Clark student after controlling for variables that are often related with these achievement measures. Specifically, we "held constant" the demographic variables that have historically exerted a strong influence on student achievement: gender, race/ethnicity, attendance rate, English language proficiency, and family socio-economic status (based on participation in the Federal Free and Reduced Meal program).

In addition, the regression model that we employed took into account students' prior achievement. Using 9th grade mathematics achievement on the Stanford 9 exam, we were

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[5] Normal Curve Equivalent or NCE scores is a different way to represent a standardized test score. NCEs avoid the problem of National Percentile Ranks (NPRs) because they are equidistant points on the scale. In other words, the distance from the 45th and 46th NCE is *exactly the same* as the distance from the 10th to the 11th NCE. For this reason, NCEs are the most statistically accurate way to ascertain how much increase/decrease has occurred over time. However, unlike NPRs which relate results back to a common point of comparison, NCEs only have meaning in relation to one another.

[6] Although we had hoped to track student eligibility and admissions to postsecondary educational institutions, this could not be realized due to lack of reliable data. Instead, we used highest math course taken as a proxy for postsecondary eligibility.

[7] While we were able to collect descriptive data on school-wide dropout rates, we were not able to obtain dropout data at the student level due to the fact that data obtained from GUSD was limited to *graduates* from 2000-2001. As a result, a dropout rate could not be included in the multivariate (regression) analyses.

able to factor in a measure of the students' academic achievement prior to in-depth exposure to STC programs and activities.[8] We used 9th grade as a control for achievement, because the core curriculum in 9th grade does not allow much curricular exposure to STC.

Before running the regression analyses, we grouped the independent variables into three groups which correspond, in turn, to the models used during the regressional analyses. Model (Group) 1 has students' demographic variables and previous mathematics achievement scores. Model (Group) 2 adds a dummy variable (i.e., yes or not), Clark student, which is our key variable of interest as it allows us to explore whether enrollment at Clark is associated with achievement benefits. Model (Group) 3 has the interaction variables between Clark Student and students' demographic variables, used to determine whether there were any additional confounding effects in the independent variables.

Analytically, we added variables for the three groups described above in order to determine the incremental increase in the proportion of variance accounted for by a new variable or a new group of variables. This method also allowed us to perform a significance test to see whether the incremental increase in adjusted R-square is statistically significant or not using F test (or distribution),[9] and it also allowed us to see whether or not predictors that are considered to be "good" at an earlier stage shed their predictive ability or usefulness when additional variables are included in the equation.

The model described below estimates the impact of both demographic characteristics and prior achievement before estimating the influence of STC on student achievement. The equation for this model (**Model 1**) is as follows:

(1) INDICATOR= _ + _ 9TH GRADE MATH + _ FEMALE + _ FREE LUNCH + _ MIDDLE EASTERN + _ ASIAN + _ HISPANIC+ _ ENGLISH LANGUAGE CLASSIFCATION + _.

We are calling this Model 1 as it was the first in a series of regression models employed as part of the study. Model 1 provides a basis of the impact of demographic variables and previous achievement scores on the indicator.

Model 2 introduces the independent variable (participation at Clark) at interest for this evaluation study. By adding Academy participation as a variable to the equation, we are able to estimate the additional proportion of variance (R squared change) that can be explained by including STC (Clark) participation as a factor in the model.

(2) INDICATOR= _ + _ 9TH GRADE MATH + _ FEMALE + _ FREE LUNCH + _ MIDDLE EASTERN + _ ASIAN + _ HISPANIC+ _ ENGLISH LANGUAGE CLASSIFCATION + _ **CLARKSTUDENT** + _.

Model 3 explores whether or not being a Clark student is confounded with the other independent variables we have in the equation. This model, in effect, estimates the

[8] There is one exception to this modeling specification. Instead of using 9th grade mathematics achievement, we used 9th grade attendance as the control for attendance in the various regression models. All other achievement variables used Stanford 9 math scores in 9th grade as the control variable for prior achievement.
[9] F-distribution is typically used for testing a hypothesis about two population variances. Standard regression outputs report the F-value and the statistical significance of the inclusion of additional variables.

interaction effect between being a Clark student and the independent variables of gender, free lunch, ethnicity and LEP.

(3) INDICATOR= _ + _ 9TH GRADE MATH + _ FEMALE + _ FREE LUNCH + _ MIDDLE EASTERN + _ ASIAN + _ HISPANIC + _ ENGLISH LANGUAGE CLASSIFCATION + _ **CLARKSTUDENT** + _ CLARK * FEMALE + _ CLARK * FREE-LUNCH + _ CLARK * MIDDLE EASTERN + _ CLARK * ASIAN + _ CLARK * HISPANIC + _ CLARK * LEP + _.

It is important to note that the examination of these potential interactive effects yielded little in the way of explanation. In other words, the interactive effects, when present, were not of sufficient influence to make this model preferable both in terms of improving the adjusted R-square values and/or the significance of the coefficients for these interaction variables. Therefore, the findings in this report will rely on **Model 2** results. Regression coefficients for all three models may be examined in detail in Appendix D.

Interpreting Regression Results

For the analyses below, the **constant** is a statistic generated by the computer that functions as a "base" against which we are comparing the impact of the different variables in the model. The constant is the average (mean) of the population when the values of all the independent variables are zero. The constant in our model represents a male 12th grade White non-LEP, non-Academy student who is not eligible for free/reduced meals.

Statistical significance is an inference, based on a statistical test, indicating that the results obtained for a research sample can be generalized to the population that the sample represents. Put another way, a value is statistically significant when its probability that a finding is not the result of a sampling error, but reflects the characteristics of the population from which the sample was drawn. Statistical significance, therefore, means that the result is not random and that we would be likely to get the sample result a high percentage of the time if the same procedures were used. Typically, the 0.05 level is used to establish statistical significance. This means that the result would occur randomly only 5% of the time (i.e., 95% probability of accuracy).

The **regression coefficients** represent the "effect" of the variable under consideration. These coefficients, therefore, indicate how much impact each variable has on student achievement in reading and math. As such, the coefficients for Clark (Sample group), Female, Free Lunch, Ethnicity, LEP, and Grade indicate the impact of these variables on the outcome measures under examination:

- Stanford 9 (NCEs for Reading, Math, Language, Social Science, and Science)
- Grade Point Average (cumulative)
- Attendance

The coefficient of determination **(adjusted R-squared)** is a measure of the proportion of variance that the regression model is able to "explain." For this study, examining changes of the R-square values allowed us to estimate how much "added value" the different models provided.[10] In this sense, R-square helps us judge how much importance to attach

[10] Please note that depending on sample size, a minor increment in R-square value may be found statistically significant. Therefore it is imprudent to rely solely on tests of statistical significance. It is therefore

to our findings based on a specific regression model. As can be seen in Appendix D, most of the variance or explanatory value of the regression is accounted for in Model 1.

Lastly, to test statistical significance, we calculated a **t-value**. The t-value is used to test the significance of the regression coefficient and to see whether it is significantly different from zero. Statistical significance of the coefficients was examined at the 0.10 and 0.05 levels. Typically, 0.05 is the threshold used to determine whether or not a result is statistically significant. At this threshold, we would reach the same conclusion 95% of the time.[11] For each statistically significant coefficient we can reject the null hypothesis that Clark students are not different from other non-STC GUSD students in terms of the outcomes under examination. In other words, a statistically significant coefficient suggests that enrollment at Clark is associated with the student outcome under examination. We have noted statistical significance at $p <= 0.05$ with an asterisk (*) and significance at the $p <= 0.10$ level with two asterisks (**) throughout the report.

For this study, we were looking to establish whether or not the regression coefficients for Clark were statistically significant, as this would indicate that achievement is associated with enrollment at Clark even after controlling for the influence of demographic and prior achievement factors. We also looked at the adjusted R-squared to determine whether the addition of the variable Clark to the regression model explained more of the variance.

Logistic Regression Analysis

For one of the student outcome variables under examination, we employed a different regression technique. As noted earlier, this study used successful passage of Algebra II or higher courses as a proxy for postsecondary eligibility. Student level data was analyzed and then recoded into a dichotomous variable – whether or not a student passed of Algebra II or higher courses. To analyze this dichotomous variable properly, we used logistic regression to determine whether being a student in Clark School increases the students' possibility of passing Algebra II or higher level mathematics courses, after taking into consideration of all the other student demographic variables and prior (9th grade) mathematics achievement. The model we used takes the following form:

PASSING ALGEBRA II OR HIGHER = _ + _ 9TH GRADE MATH SCORES + _ FEMALE + _ FREE-LUNCH + _ MIDDLE EASTERN + _ ASIAN + _ HISPANIC + _ LEP + _ CLARK STUDENT + _.

Logistic regression is similar to a linear regression model, but is suited to models where the dependent variable is dichotomous (i.e., only two possibilities as opposed to a range of possibilities). The model is designed to estimate the probability that students will pass Algebra II, which can then be used to compare the intervention (Clark) and control (non-STC GUSD) samples. In essence, logistic regression coefficients estimate odds ratios for each of the independent variables in the model. If the odds ratio equals one, then the two sets of odds are equal. For these results, we use odds ratio numbers to describe outcomes.

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recommended that meaningfulness be the primary consideration in deciding what is the "best" equation and that tests of statistical significance be used as adjuncts in such decisions.

[11] This means that 5% of the time the finding would represent an erroneous result.

3. Qualitative Research Findings

The section below describes key qualitative findings based on the site visits conducted at Clark in May-June and November of 2001. The composition of focus groups and interviews for these site visits are described in more detail in Section 2 on Methodology of this report. The visits at Clark were augmented by site visits conducted at the two GUSD high schools selected for participation in the State's CORE STC project. Staff from Public *Works,* Inc. conducted one-day site visits at Crescenta Valley and Glendale high schools in October and November 2001 aimed at providing a comparison point for analyzing the responses of Clark staff and students.

Description of Clark Magnet High School

Clark Magnet High School began operation as a school of choice in September of 1998. Opened to relieve overcrowding at the other three GUSD high schools, Clark was designed to function as a specialized magnet focused on science and technology. In creating the vision for the school, District and community stakeholders developed a vision of Clark as a school that would exemplify STC principles through thematic and project-based learning instructional approaches as part of the science and technology core curriculum**.** The educational vision for Clark also emphasized student exposure to adults working in science and technology careers through regular career assemblies as well as opportunities for participation in job shadowing and internships.

School Structure and STC Staffing

Clark's curriculum was designed around three "Strands of Learning" that were intended to guide the students' educational program throughout their four years at the school. The three strands are:

- Science, Mathematics and Engineering: This strand places an emphasis on in-depth engineering, physics, and other non-biological sciences and their related math courses.
- Technology Systems: This strand has a hardware-oriented theme that includes study in computer hardware and programming, and network infrastructure.
- Technology Applications: This strand is more product-oriented and places an emphasis on the results of technology use, including business applications, animation, multimedia, and computer-aided design (CAD).

Despite the existence of these "career strands," school stakeholders acknowledge that there is little formal reinforcement of the different pathways. Indeed, none of the students interviewed identified with the different strands. Students could, however, identify elective courses that might have been linked to the strands. Follow-up interviews with school administrators and the STC coordinator indicate that the strands are used only as part of student orientation and initial registration. The different career strands also have some meaning in terms of how teachers articulate with one another. In sum, students cannot be identified by strand and even teachers only loosely identify by strand for some articulation meetings.

Clark has resisted moving toward a more formalized pathway concept and/or the school-within-a-school approach more commonly used to differentiate career academies within a traditional high school. The "fluid" nature of the school's STC orientation, in turn, has resulted in a kind of *de facto* downplaying of the STC elements of the school's curriculum in favor of a more generalized, whole school approach to reform based on hands-on science and access to technology. While STC elements are integrated across strands, the tendency of students and staff to resist the career strands as an organizational structure serves to downplay the STC principles undergirding the school. As such, staff and students view the entire school as an alternative to a comprehensive high school without necessarily making the connection to STC as a differentiating factor.

This aspect of the school is important insofar as student responses to survey data (see Section 4 below) suggest that Clark students are less likely to indicate participation in STC activities compared to career academy students at other GUSD high schools that are employing the school-within-a-school approach to STC implementation. In particular, there was a palpable sense of GUSD students at career academies identifying with the school-to-career "label" and the activities associated with STC.

The school works on a "block schedule" in which students attend four courses a day. This means that for six of their courses they meet only every other day (7th period class meets every day). This schedule allows for more time in each class period (90 minutes) for group projects and other methods of hands-on learning. Clark is the only GUSD high school utilizing a block schedule.

Most STC coordination at Clark is conducted on a part-time basis by a teacher who is also the Career Guidance and Work Experience teacher. This Coordinator is responsible for securing internships for students and job shadowing opportunities for both students and faculty. Additionally, the STC Coordinator is charged with creating and maintaining partnerships with businesses in the community and surrounding areas. The part-time nature of the position is possible because STC is reinforced by faculty members and students have increasingly taken the initiative for securing their own work-based learning experiences. These findings contrasted markedly with the other GUSD high schools where student exposure to work-based learning tended to be limited to students participating in career academies organized as schools-within-a-school if at all.

Student Recruitment

Clark enrolls eligible students through a lottery process. Clark is open to all GUSD students who meet the following:

- 2.0 GPA average for the 7th & 8th grades
- Good citizenship and attendance record
- Prepared to enter into Algebra (or take Introduction to Algebra, or equivalent, during the Summer prior to enrollment)

While student selection is done by a lottery, it is not a completely random process. Instead, the lottery is conducted in such a way to attempt to keep the proportions of students from each potential comprehensive high school equal. In other words, Clark's lottery intends to recruit an approximately equal number of students who would have otherwise attended

Glendale, Hoover or Crescenta Valley High School. This is in keeping with the fact that Clark was opened as a high school, in part, to relieve District overcrowding.

The primary attractions cited by students as reasons to attend Clark included:

- Access to and use of computers and related technologies;
- Parental influence (i.e., parents may see "Magnet" as somehow better due to "smarter" students, harder classes, and less discipline/safety issues);
- Block scheduling (more time for projects and other hands-on instruction); and
- More interaction with teachers and other students (related to school size).

Student recruitment into career academies at the other GUSD high schools tended to be done by the STC coordinator drawing from students already enrolled at the high school. Typically, the coordinators visited the mandatory 9th grade Health and Guidance class to make a presentation about the career academy options at the school. Academic prerequisites for participation in career academy programs were not mentioned.

School-Based Activities

Curricular Integration. Most of the teachers at Clark believe that they are expected to incorporate STC themes into their classes. All teachers interviewed indicated that they attempt to integrate workplace skills and many also try to incorporate group projects into their coursework. However, teachers indicated that they were less likely to integrate career themes into their core academic coursework. Outside of career academies, the other GUSD high schools reported that there are no coordinated efforts to integrate STC into the curriculum.

Career Exploration. One of the most common methods through which students are exposed to careers is the Distinguished Speakers Series. This program brings in speakers from a variety of career fields to speak to the students about their careers and the types of work that they do. The speakers come during the tutorial period approximately once a month. Another major source by which students said they were exposed to careers was in their technology elective courses. In addition, both students and teachers felt that a major source of career exploration came from the clubs and other extracurricular activities that have arisen at Clark. Often, when a group of students became interested in a particular topic and found a teacher who was also interested, they would form a group that would meet outside of school hours. Currently, there are more than a dozen student clubs, many of which reflect an academic and/or career interest (e.g., journalism, Robotics, etc.). At the other GUSD high schools, career exploration primarily occurred as part of the mandatory 9th grade Health and Guidance course. At one high school, option career assemblies were also mentioned as a vehicle for exposing students to adults from the workplace.

Project-Based Learning. Project-based learning is a central component in almost all of the classes at Clark. Students are afforded many opportunities to work in groups, give presentations, and other activities that go beyond just listening to a lecture. Clark also requires a Senior Project to graduate. Teachers are responsible for mentoring at least three students during the Senior Project, providing these students with resources and aiding the students in developing a project plan. The purpose of the project is to explore an area, hopefully a career area, more in depth. The first semester is spent writing a research paper

on the topic that the student chooses. The second semester the student is required to put in at least fifteen hours of field work (e.g., topic is teaching, acted as teaching assistant in elementary school) and must develop some sort of physical product (e.g., topic was auto mechanics, product was a model car). The students are also required to turn in a portfolio with their project which contains field work logs, a resume, letters of reference, etc., and have to present their projects in front of faculty and community judges. The requirement for a Senior Project does not exist at the other GUSD high schools included in the study.

Work-Based Activities

Internships and Job Shadowing. Most of the 12th grade students interviewed had participated in at least one internship or job shadow; many of them had had multiple experiences. Many of the 10th grade students had also participated in one or both of these programs. The main complaint from the students who had participated in job shadowing was that there were not enough opportunities to shadow in technology occupations despite the school's focus on technology. Outside of the career academies, the other two GUSD high schools included in the study reported limited student participation in work-based learning.

Teacher Participation in STC. One of the main sources of STC professional development for teachers are job shadowing opportunities that the STC coordinator organizes for those teachers who are interested in learning more about the day-to-day happenings in a variety of work settings. Apart from teachers working in career academies, no overt participation in STC by teachers was mentioned at the two GUSD comprehensive high schools.

Service Learning. Community service has been a large part of many students' experiences at Clark. While only ten hours in the freshman year are required, the school encourages students to complete 100 hours prior to graduation (10 in 9th, 20 in 10th, 30 in 11th & 40 in 12th), something which may become a school requirement in the future. While not necessarily connected to the science and technology focus at the school, Clark stakeholders believe that service learning is an important way for students to obtain work-based experiences and to apply learning in hands-on, real world situations. At one of the two comprehensive GUSD high schools, 10 hours of service learning was required.

Support and Sustainability

Employer Support. Clark has strong relationships with many businesses that it relies on for helping give the students resources and opportunities to participate in activities that expose them to actual workplace settings. Three of the largest business partners Clark has enjoyed strong relationships with are Compaq, the Jet Propulsion Laboratory, and DreamWorks SKG. All three of these companies were part of the initial Task Force that created Clark and all three still help in providing planning and technology, as well as opportunities for students to take part in work-based learning. At one of the other two GUSD high schools included in the CORE study, there are strong linkages to major employers (e.g., Jet Propulsion Laboratory) which provide support for student exposure to the world of work.

District Support. GUSD has been very supportive of Clark, especially in the initial start-up of the school and pursuit of outside funding. Currently, District support involves staff time on the Task Force and through technology support. The Verdugo STC partnership has

supported Clark through the provision of funds (including Perkins) and training for the STC coordinator and other teachers at Clark. The director of the partnership has also aided the school in determining what funding sources are available to them and in helping them procure more funding. Recently, GUSD has required all schools to engage in strategic planning which has, in turn, prompted Clark to revisit the original Task Force recommendations and to consider future directions as part of WASC accreditation scheduled for 2001-2002. This strategic planning should help solidify sustainability at Clark.

4. Survey Research Findings

Quantitative findings are divided into two primary sections. In section 4, we present results from the two student surveys (CORE Senior Survey and Senior Follow-Up) administered as part of the study. In section 5, we present descriptive data comparing Clark juniors and seniors from 2000-2001 (i.e., the first two cohorts of students to attend the school) to a control group of demographically similar GUSD 11th and 12th graders not participating in an extensive STC experience while in high school. Lastly, we present results based on regression analyses of the Clark (intervention) and control (non-STC GUSD students), controlling for demographic characteristics and prior achievement in order to isolate the effect of STC participation on student outcomes.

Student Survey Results

As indicated in Section 2, the CORE Senior Survey was administered in Spring to three of the four GUSD high schools that were selected to participate in the State-wide CORE STC evaluation. All 128 12th grade and all 268 11th grade students from Clark were surveyed (i.e., no sampling employed). At the other two high schools (Glendale and Crescenta Valley) a random sample of 150 12th grade students was selected to participate in the CORE survey.[12] The section below presents statistically significant findings based on the survey responses from the 608 students completing the survey:

- PLUS (Clark seniors and juniors reported separately, N=360);
- High (Glendale and Crescenta Valley seniors participating in career academies while in high school, N=27), and;
- Other (Glendale and Crescenta Valley seniors not participating in an extensive STC experience while in high school, N=221).

In this section, we have only presented survey findings that achieved statistical significance ($p <= 0.05$) across the four samples PLUS juniors, PLUS seniors, High and Other. Complete survey results may be viewed in Appendix B.

Participation in STC Activities

Among the Senior Survey respondents, High students were most likely to participate in STC activities while in high school. Rates of STC participation among High (career academy) students exceeded those of both PLUS (Clark) students and Other, non-STC students at Glendale and Crescenta Valley High School. Career fairs and guest speakers from business and industry was the only STC activity that involved more than half of all PLUS, High and Other students.

[12] Students at Clark Magnet are all considered "High" in terms of extensive STC participation. The term PLUS is used to separate PLUS (Clark) and High (Glendale and Crescenta Valley academy students). Additional Note: the CORE Survey administration did not require administering surveys to Junior. Public Works, Inc. included this method in our PLUS design. Obviously the Follow-up survey was not administered to these juniors. Juniors were seniors in Fall 2001, and therefore, not graduates in need of follow-up.

Table 4.1: STC Participation Rates Among CORE Survey Respondents (%)

	PLUS (11th grade)	PLUS (12th grade)	High	Other
Job Shadowing	20.3% 48	31.7% 40	61.5% 16	23.0% 51
Internship or Work Experience related to school	11.0% 26	24.2% 30	61.5% 16	21.7% 48
Career fair or outside career speaker	67.1% 159	51.6% 65	76.0% 19	55.4% 123

Statistically significant, P < = 0.05

In terms of STC participation, the PLUS and CORE (both High and Other combined) student groups differed from one another in terms of participation in internships and work experience directly related to high school learning. CORE students were more likely (26%) to participate in these STC experiences compared to PLUS (16%) students.

Awareness of STC Options

To some extent, rates of STC participation were reflected in student awareness of STC activities occurring at their school. For instance, High students were much more likely (81%) to indicate knowing about career related activities available at school compared to either PLUS or Other students. Interestingly, most PLUS and Other students wanted more opportunities to participate in career related activities while in high school. Indeed, the PLUS sample (11th and 12th grade combined) was more likely to say that they wanted to participate in career related activities (74%) compared to the CORE (High and Other combined) group overall (61%). As shown below, less than half of the High students felt that additional career related opportunities were needed.

Table 4.2: STC Awareness Rates Among CORE Survey Respondents (%)

	PLUS (11th grade)	PLUS (12th grade)	High	Other
Know about career related activities available at school	43.9% 104	52.8% 66	80.8% 21	57.0% 126
Want more opportunities to participate in career related activities	77.6% 184	67.7% 84	46.2% 12	62.9% 139

Statistically significant, P < = 0.05

Benefits of Participation in STC Activities

When asked about the benefits of participating in STC activities and about their high school experience in general, High students tended to be the most positive. For example, the vast majority of High students reported that STC participation had helped them understand why doing well in school is important. These students were also more likely to say that high school had been meaningful and interesting and that school experiences played a role in helping them set goals and learn about skills needed for potential careers.

High students were also more likely to say that they had received career guidance and education and training needed for careers. Indeed, access to career guidance services was one of the only areas where PLUS and CORE groups differed from one another in a statistically significant manner. Whereas 31% of the PLUS group (11th and 12th graders combined) felt that guidance had been useful, 39% of the CORE (High and Other combined) indicated agreement with the survey item.

Overall, it is interesting to note that the responses for the PLUS and Other students did not differ markedly from one another. Based on the CORE survey results, it appears that students at Clark did not accrue the benefits of STC that might be assumed given the school's organization around STC principles.

Table 4.3: Perceived Benefits of STC Participation Among CORE Survey Respondents (%)

	PLUS (11th grade)	PLUS (12th grade)	High	Other
Helped me understand why doing well in school is important	41.0% 96	30.4% 38	84.6% 22	34.4% 75
Encouraged me to set goals related to education or career	46.2% 109	37.1% 46	88.5% 23	41.7% 91
Made school meaningful and interesting	33.1% 78	30.4% 38	80.8% 21	31.7% 69
Learned about skills needed for careers I am considering	32.8% 78	50.0% 62	73.1% 19	40.9% 90
Know what education or training I need for career(s) I am considering	52.7% 125	68.3% 86	76.9% 20	63.5% 141
School has provided useful guidance about choosing a possible career	25.5% 60	40.0% 50	61.5% 16	36.8% 81
Confident that I will be able to reach my career goals	65.1% 155	79.4% 100	80.8% 21	74.7% 165
High school grades do not really matter when it comes to getting the job I want	16.9% 40	28.6% 36	11.5% 3	26.1% 57

Statistically significant, $P <= 0.05$

Post High School Plans

The different respondents also differed in terms of their announced post-graduation intentions. High students were most likely to indicate an intention to attend a trade or vocational school (15%) and join the military (19%). PLUS students, by contrast, were most likely to say they would attend a four-year college or university (73% of juniors and 63% of seniors) compared to either High (54%) or Other (48%) students. Two year colleges were the destination for about one-third of the PLUS and High students, compared to over half (52%) of the Other students. Interestingly, approximately half of the PLUS students said that they would find a part-time job upon high school graduation compared to about one-third of the High and Other students.

Table 4.4: Immediate Post High School Intentions Among CORE Survey Respondents (%)

	PLUS (11th grade)	PLUS (12th grade)	High	Other
Attend trade or vocational school	3.0% 7	0.8% 1	15.4% 4	7.8% 17
Attend two-year college	33.6% 80	38.1% 48	30.8% 8	52.3% 116
Attend four-year college or university	73.0% 173	62.9% 78	53.8% 14	47.5% 104
Join military	1.7% 4	4.8% 6	19.2% 26	2.7% 219
Find part-time job	50.2% 119	46.0% 57	38.5% 10	34.7% 76

Statistically significant, $P <= 0.05$

Summary and Interpretation of Results

The most significant finding from the CORE student survey is that there are few significant differences in the survey responses of Clark 11th and 12th grade students compared to 12th graders at Glendale and Crescenta Valley. Indeed, the CORE survey results suggest that the influence of STC participation is most apparent among the non-Clark "High" students. These career academy students participating in school-within-a-school program were more likely to respond positively to survey items on STC participation compared to the Clark students (all of whom were classified as "High") who participated in a whole school reform modeled on STC principles.

The low levels of reported participation among Clark (PLUS) students in STC activities may relate to student familiarity with certain terminology used at the school. For example, Clark uses the term "career strands" rather than "career pathways" to identify STC participation. Therefore, question wording about the benefits of participation in "a career academy, a career pathway, tech prep, or other career-related activities" may have confused the Clark student respondents. On the whole, however, the survey findings seem to suggest that Clark students do not explicitly identify with the STC label even though the school has been structured around STC principles. Indeed, the survey results are difficult to explain in light of the fact that the STC orientation of Clark combined with the school's block schedule allows time for students to participate in project-based learning and career exploration, particularly during academic electives. In addition, the requirement for a Senior Project provides a culminating experience for students that encourages career exploration, work-based learning and the application of hands-on, project-based learning.

One possible explanation for the survey results relates to the anomalous character of the initial cohort of students to attend Clark. Qualitative data gathered during this study suggests that Clark students, particularly those in the initial cohort of students (i.e., seniors in 2000-2001) attending the school, may have received a less overt delivery of STC. Although the school as a whole is organized around STC principles, students in the initial cohort (particularly the first group of students to enroll at the school) attended the school while it was implementing and refining the curriculum. However, it is important to note that students at all grade levels do not identify with the various "career strands" at the school and school stakeholders acknowledge that the school has deliberately eschewed the structure of a formalized "strand" or "pathway" approach. Moreover, site visits to the campus suggest that the extent of STC curricular integration continues to be rare in core academic classes three years into the effort. As such, the survey findings corroborate the lack of explicit STC implementation at Clark.

Follow Up Student Survey Results

In the section below, <u>we have only presented survey findings that achieved statistical significance($p <= 0.05$)</u> related to differences among the three groups under examination based on the 261 follow-up survey respondents:

- PLUS (former Clark seniors, N=92);
- High (former Glendale and Crescenta Valley seniors participating in career academies while in high school, N=20), and;

- Other (former Glendale and Crescenta Valley seniors not participating in an extensive STC experience while in high school, N=169).

Enrollment and Aspirations in Postsecondary Education

Data from the follow-up survey suggests that there are pronounced differences in the post-high school plans of Clark students compared to their peers at other GUSD high schools. For example, 93.5% of Clark seniors reported enrolling in postsecondary education, compared to 70% of the High students and 84.5% of the Other (non-STC) students at Glendale and Crescenta Valley high schools. Among the small number of those not enrolled in postsecondary education, most indicated an intention to do so.

Table 4.5: Postsecondary Enrollment Patterns Among Follow-Up Survey Respondents (%)

	PLUS	High	Other
Currently Enrolled in Postsecondary	93.5% 86	70.0% 14	84.5% 125
4-year college or university	45.9% 39	42.9% 6	25.6% 32
2-year public college	52.9% 45	50.0% 7	69.6% 87
Vocational/Technical	1.2% 1	7.1% 1	4.8% 6

Statistically significant, P < = 0.05

Clark students were much more likely to enroll in four-year colleges and universities (46%) compared to 43% of High students and 26% of Other (non-STC) students. Indeed, students who did not participate in in-depth STC experiences while in high school were most likely to attend a public two-year community college (70% compared to 53% of the Clark graduates and 50% of High students).

There were some statistically significant differences between the various respondent groups in terms of postsecondary degree aspirations. Whereas a large proportion of Other students said that they were likely to pursue a baccalaureate degree (41%), PLUS and High students were more likely to aspire to an advanced degree. More than half of both PLUS and High students hoped to attain a Master's degree (approximately 62% of both groups). Moreover, nearly one-in-five (22%) of the PLUS students aspired to a Ph.D. or professional degree (MD or DDS) compared to 13% of the High and 4% of Other student.

Participation in the Workforce

While there were no statistically significant differences among the different respondents in terms of their employment status overall, High students were much more likely (75%) to be working full-time compared to both Clark (16%) and Other (15%) students. The High students also were more likely to receive employment benefits (62.5% compared to 18% of PLUS and 24% of Other students). Among those employed, both PLUS and Other students tended to be part-time workers (84% and 85%, respectively) without benefits. The High group was also more likely to enlist in the military (10%) compared to either PLUS (4%) or Other (1%) students.

Table 4.6: Employment Patterns Among Follow-Up Survey Respondents (%)

	PLUS	High	Other
Full time (35+ hours per week)	16.2% 6	75.0% 6	15.3% 11
Part-time (less than 35 hours per week)	83.8% 31	25.0% 2	84.7% 61
Receiving benefits	18.4% 7	62.5% 5	23.9% 17
Military	4.3% 4	10.0% 2	1.4% 2

Statistically significant, P < = 0.05

Perceived benefits of High School STC Activities

Despite lower rates of employment participation, Clark graduates (PLUS students) were more likely to agree that occupational and vocational classes had prepared them for current employment (62% compared to 37% of High and 35% of Other students). At the same time, High students who had participated in a career academy experience while in high school were most likely to say that STC activities had been beneficial for their current job or education (95% compared to just 26% of PLUS and 39% of Other). When asked about other aspects of their high school experience, there were negligible differences between Clark graduates and their peers at the other two CORE GUSD high schools.

Table: 4.7: Perceptions of High School Experience Among Follow-Up Survey Respondents (%)

	PLUS	High	Other
STC beneficial to current job or education			
Yes beneficial	26.1% 24	95.0% 19	39.2% 58
Did not participate in STC	65.2% 60	5.0% 1	28.4% 42
How well occupational/vocational classes beneficial for current job			
Very Well or Well	62.0% 57	36.9% 7	35.1% 52
No occupation or vocational courses	26.1% 24	21.1% 4	27.7% 41

Statistically significant, P < = 0.05

Summary and Interpretation of Results

The results of the follow-up survey suggest that Clark students were most likely to follow through on their intentions (as reported in the Senior Survey) to enroll in postsecondary education. Clark students were most likely to enroll in four-year colleges and universities and to aspire to advanced degrees. Given the emphasis on college preparation at Clark, we were surprised to find no statistically significant differences among respondents in terms of how well high school prepared students academically for postsecondary education.

As in the case of the Senior Survey, follow-up survey respondents from Clark did not appear to identify with the STC "label." Indeed, both PLUS and Other students were less likely to indicate participating in STC activities while in high school, compared to the High (career academy) students. As such, Clark respondents were less likely to identify benefits linked to STC participation.

5. Student Outcome Findings

In this section, we present descriptive data comparing Clark juniors and seniors from 2000-2001 (i.e., the first two cohorts of students to attend the school) to a control group of demographically similar GUSD 11th and 12th graders not participating in an extensive STC experience while in high school. Second, we present results based on regression analyses of the Clark (intervention) and control (non-STC GUSD students), controlling for demographic characteristics and prior achievement in order to isolate the effect of STC participation on student outcomes.

Descriptive Statistics

The analysis of student outcome data for this study included both descriptive and regression analyses. The section below presents descriptive analyses of the trends present in the data, comparing Clark 11th and 12th grade students (the first two cohorts of students to attend the school) to a control group of GUSD high school students not involved in in-depth STC experiences while in high school (methodology is described in Section 2).

As shown in Table 5.1 below, the number of student records included in the descriptive analyses (and regressions which follow) included 411 (230 Clark and 181 Control) from the 11th grade cohort (juniors in 2000-2001) and 198 (50 Clark and 148 Control) among the 12th grade cohort (seniors in 2000-2001). As indicated in Section 2, data was included only when there were three complete years of Stanford 9 scores. In addition, the data provided by GUSD included only graduates (among the 12th graders).

Table 5.1: Student Sample for Descriptive and Regression Analyses

	11th Grade Cohort	12th Grade Cohort	Total
Clark (Intervention)	230	50	280
Non-STC GUSD (Control)	181	148	329
Total	**411**	**198**	**609**

In order to determine whether comparisons of the 11th and 12th grade cohorts of Clark and the control group students were statistically significant, we tested for differences at the .05 level for overall results. In reporting the descriptive results, we have noted whether or not results are statistically significant at the .05 level. For more detailed tables on the descriptive results please refer to Appendix C.

Stanford 9 Results

Stanford 9 data for the last three years (1999-2001)[13] was analyzed to compare the intervention (Clark) and control groups. As can be seen in Tables 5.2-5.3, Clark juniors tended to outperform their GUSD counterparts in all subtests of the Stanford 9. All Stanford 9 comparisons among the 11th grade cohort were statistically significant (p <=

[13] Since SAT-9 tests are not administered to high school seniors, scores for Grade 11 Cohort were collected for 1999-2001 while Grade 12 Cohort SAT-9 scores were collected for 1998-2000.

0.05). The most pronounced difference occurred on the Math section of the exam where Clark 11th graders improved 2.5 NCEs compared to a decline of 2.0 NCEs among the control group. Relatively large differences were also seen on the Language and Reading portions of the Stanford 9. Comparisons between the Clark 12th grade cohort and the control group were statistically significant for all but the Language subtest.

Table 5.2: Stanford 9 Results (NCE Scores), Grade 11 Cohort Comparison*

	1999	2000	2001	Net Change
Intervention Group (Clark) (N=230)				
Language	61.8	62.4	62.2	0.4
Reading	51.8	53.7	55.8	4.0
Math	67.6	66.4	70.1	2.5
Science	55.5	56.8	58.9	3.4
Social Science	56.0	55.4	64.1	8.1
Control Group (N=181)				
Language	60.4	56.8	57.9	-2.5
Reading	48.8	49.7	50.0	1.2
Math	61.3	57.2	59.3	-2.0
Science	51.3	53.2	53.4	2.1
Social Science	51.8	48.1	59.8	8.0

* Overall comparisons between Clark and the control group were statistically significant ($p <= 0.05$).

Table 5.3: Stanford 9 Results (NCE Scores), Grade 12 Cohort Comparison*

	1999	2000	2001	Net Change
Intervention Group (Clark) (N=50)				
Language	65.9	59.3	62.2	-3.8
Reading	52.3	52.8	56.3	4.0
Math	52.3	65.5	71.1	18.9
Science	57.9	58.3	59.1	1.2
Social Science	57.9	54.8	66.6	8.7
Control Group (N=148)				
Language	59.6	52.4	59.1	-0.5
Reading	46.6	48.5	49.9	3.3
Math	46.6	52.8	62.7	16.1
Science	49.9	53.1	53.3	3.4
Social Science	50.9	52.3	59.8	8.9

* Overall comparisons between Clark and the control group were statistically significant ($p <= 0.05$) except results on the Language test.

Attendance Rate

Public *Works*, Inc. compared the 2000-2001 attendance rate of the Clark (intervention) sample to that of the control group. As can be seen in Table 4.4 below, there were only small differences between the attendance between the groups. Indeed, both groups exhibited a rather high (i.e., over 95%) rate of attendance. However, none of these differences were statistically significant. In other words, enrollment at Clark is not associated with higher attendance compared to other, non-STC students attending GUSD high schools.

Table 5.4: AVERAGE ANNUAL ATTENDANCE RATE, 2000-2001

	Clark		Control		Difference	
	N	%	N	%	N	%
Overall	**280**	**96.4%**	**327**	**96.9%**	**-47**	**-0.5%**
Ethnicity						
Middle Eastern	118	95.5%	133	96.7%	-15	-1.2%
Asian/Filipino/Pacific Islander	88	98.2%	88	98.1%	0	0.1%
White	57	95.6%	77	96.0%	-20	-0.4%
Latino/African American/Native American	17	95.7%	29	96.5%	-12	-0.8%
English Language Proficiency						
Limited English Proficient	26	97.0%	48	95.8%	-22	1.2%
FEP/Native English	254	96.3%	279	97.1%	-25	-0.8%
Free/Reduced Meal Program						
Free/Reduced Lunch	76	96.6%	102	96.6%	-26	0.0%
No Lunch Assistance	204	96.6%	225	97.0%	-21	-0.4%
Gender						
Female	97	95.9%	182	96.8%	-85	-0.9%
Male	183	96.6%	145	97.0%	38	-0.4%

* Results not statistically significant

Grade Point Average

As can be seen from Table 5.5 below, Clark students tended to outperform the control group in terms of cumulative grade point average (GPA). The average GPA among Clark students (both the 11th and 12th graders) was 3.07, compared to 2.94 among the control group. However, comparisons were only statistically significant for students in the 11th grade cohort (i.e., juniors in 2000-2001). Students in the 11th grade at Clark averaged a GPA of 3.05 compared to 2.82 among comparable students in the control group. Among the 12th grade cohort, Clark student scores were not significantly different from those of the students in the control group (3.16 for Clark and 3.08 among the control group).

Table 5.5: AVERAGE STUDENT CUMULATIVE GRADE POINT AVERAGE, 2000-2001

	Clark		Control		Difference	
	N	**GPA**	**N**	**GPA**	**N**	**GPA**
Overall	**280**	**3.07**	**329**	**2.94**	**-49**	**0.13**
Ethnicity						
Middle Eastern	118	2.93	134	2.82	-16	0.11
Asian/Filipino/Pacific Islander	88	3.31	88	3.09	0	0.22
White	57	3.04	78	3.06	-21	-0.02
Latino/African American/Native American	17	2.88	29	2.73	-12	0.15
English Language Proficiency						
Limited English Proficient	26	2.75	49	2.52	-23	0.23
FEP/Native English	254	3.10	280	3.02	-26	0.08
Free/Reduced Meal Program						
Free/Reduced Lunch	76	2.92	102	2.76	-26	0.16
No Lunch Assistance	204	3.12	227	3.02	-23	0.10
Gender						
Female	97	3.25	184	3.05	-87	0.20
Male	183	2.97	145	2.80	38	0.17

***** Overall comparisons between Clark and the control group were statistically significant ($p <= 0.05$) only for the 11th grade cohort. Results for the 12th graders were not statistically significant.

Course Credits Earned

To examine the propensity of students to graduate on time, we analyzed student level data in terms of the cumulative number of credits earned (see Table 5.6 below). With 220 credits required for graduation, Clark juniors earned an average of 209 credits by the end of the 2000-2001 school year compared to 183 credits among the control group juniors. Likewise, Clark seniors earned 259 credits on average compared to 247 among students in the control group. These results were statistically significant for both the 11th and 12th grade cohorts of students under examination.

Table 5.6: CUMULATIVE CREDITS EARNED

	Clark		Control		Difference	
	N	**Credits**	**N**	**Credits**	**N**	**Credits**
Overall	**280**	**217.8**	**329**	**211.7**	**-49**	**6.1**
Ethnicity						
Middle Eastern	118	210.9	134	207.7	-16	3.2
Asian/Filipino/Pacific Islander	88	227.6	88	217.3	0	10.3
White	57	218.3	78	211.6	-21	6.7
Latino/African American/Native American	17	213.5	29	213.5	-12	0
English Language Proficiency						
Limited English Proficient	26	210.8	49	202.7	-23	8.1
FEP/Native English	254	218.5	280	213.3	-26	5.2
Free/Reduced Meal Program						
Free/Reduced Lunch	76	209.9	102	202.8	-26	7.1
No Lunch Assistance	204	220.8	227	215.7	-23	5.1
Gender						
Female	97	218.6	184	216.1	-87	2.5
Male	183	217.4	145	206.1	38	11.3

* Overall comparisons between Clark and the control group were statistically significant ($p <= 0.05$).

Highest Math Course Taken (Postsecondary Eligibility)

Highest math course taken by students was employed as a proxy for postsecondary eligibility. Specifically, we examined the extent to which students in both the intervention and control groups successfully passed (with a letter grade of "C" or better) Intermediate Algebra (sometimes called Algebra II). This is the baseline course required for admission to the University of California (UC) and the California State University (CSU) as set forth in A-G requirements. As seen in Table 5.7 below, Clark students were more likely (83%) to pass Algebra II or another higher-level math course compared to students in the control group (62%). The higher rate of mathematics achievement is likely related to the fact that completion of Algebra in middle school is a prerequisite for admission to Clark Magnet High School.

Table 5.7: PERCENT OF STUDENTS PASSING ALGEBRA 2 OR HIGHER BY POPULATION

	Clark		Control		Difference	
	N	%	N	%	N	%
Overall	**280**	**73%**	**329**	**43%**	**-49**	**30%**
Ethnicity						
Middle Eastern	118	64%	134	35%	-16	29%
Asian/Filipino/Pacific Islander	88	85%	88	57%	0	28%
White	57	75%	78	44%	-21	32%
Latino/African American/Native American	17	71%	29	38%	-12	33%
English Language Proficiency						
Limited English Proficient	26	65%	49	18%	-23	47%
FEP/Native English	254	74%	280	48%	-26	27%
Free/Reduced Meal Program						
Free/Reduced Lunch	76	63%	102	30%	-26	33%
No Lunch Assistance	204	77%	227	49%	-23	28%
Gender						
Female	97	80%	184	45%	-87	36%
Male	183	69%	145	41%	38	28%

***** Overall comparisons between Clark and the control group were statistically significant ($p <= 0.05$).

Dropout Rate

As indicated earlier in the report, we were not able to compare the intervention and control groups in terms of dropout rates because the data obtained from GUSD included only 12th grade graduates and those with three years of Stanford 9 scores (i.e., having taken the Stanford 9 in grades 9-11). However, because the intervention group at Clark included all 11th and 12th graders, we can examine the school-wide dropout rates, comparing Clark to District-wide averages. As shown in Table 5.8, Clark did not record any dropouts in 1998-1999 or 1999-2000. Data for 2000-2001 is not yet available from the State. By contrast, between 1%-2% of students in GUSD dropped out during the same time period. Due to lack of student level data, no statistical significance could be computed.

Table 5.8: Dropout Rate, Clark Compared to GUSD

	Clark	GUSD
1997-1998		
Number	N/A	59
Percent	N/A	0.6%
1998-1999		
Number	0	127
Percent	0%	1.3%
1999-2000		
Number	0	142
Percent	0%	1.4%

Source: CBEDS

Multivariate (Regression) Results

The section below provides a summary of the regression results comparing the first two cohorts of Clark students (juniors and seniors in 2000-2001) to a control group of non-STC students attending the other three high schools in GUSD. The regression model controls for both student demographic characteristics and prior academic achievement using 9th grade Stanford 9 Math scores. For a description of methodology and our reason for selecting the Model 2 regression, see Section 2.

As indicated above in the introduction to the descriptive data analyses, 411 student records were used as part of the regression analyses (230 Clark and 181 Control) from the 11th grade cohort (juniors in 2000-2001) and 198 (50 Clark and 148 Control) among the 12th grade cohort (seniors in 2000-2001). As indicated in Section 2, data was included only when there were three complete years of Stanford 9 scores. In addition, the data provided by GUSD included only graduates (among the 12th graders).

The constant in our model represents a male, 12th grade, White non-LEP, non-Academy student who is not eligible for free/reduced meals. In order to determine whether comparisons of the 11th and 12th grade cohorts of Clark and the control group students were statistically significant, we tested for differences at the .05 level. In reporting the results, we have noted whether results are statistically significant at the .05 level. Complete tables of regression results may be found in Appendix D.

Stanford 9

Across nearly all subtests, the best predictors of Stanford 9 achievement were English language proficiency (LEP status) and prior academic achievement (Grade 9 Stanford 9 Math). However, controlling for student demographic characteristics and prior achievement, participation at Clark Magnet High School was most likely to be associated with higher Stanford 9 scores in Math.

Depending on the year and grade level cohort, Clark students scored 4-8 NCEs higher than the control group students after taking other factors into account (see Table 5.9 and 5.10 below). Regression results for Math were significant at the 0.05 level for the 11th grade cohort in both 2000 and 2001, as well as for the 12th grade cohort in 1999. These findings may be related to the school's focus on science and technology which involve students in practical applications of mathematical reasoning as well as the fact that Clark students are required to enroll in Algebra.

Table 5.9: 11th Grade Cohort, SAT-9 Math (Model 2 Regression)

SAT-9 MATH	1999-00			2000-01		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.59	411		.36	411	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	17.17	6.23		34.09	8.94	
CLARK	4.18	3.39	*	6.95	4.07	*
G9 SAT-9 Math	0.71	20.87	*	0.46	9.68	*
Female	-2.74	2.23	*	-2.70	1.59	
LEP	-5.96	3.10	*	-6.05	2.27	*
Free Lunch	0.72	0.50		-1.08	0.53	
Middle Eastern	-1.86	1.11		-4.58	1.97	*
Latino	-5.29	1.85		-4.72	1.19	
All Asian	-1.96	1.15		7.40	3.13	*

* statistically significant at 0.05 level

Table 5.10: 12th Grade Cohort, SAT-9 Math (Model 2 Regression)

SAT-9 MATH	1998-99			1999-00		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.55	198		.33	198	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	21.37	5.05		30.11	5.62	
CLARK	7.76	3.34	*	5.10	1.73	
G9 SAT-9 Math	0.69	11.44	*	0.60	7.79	*
Female	-1.20	0.59		0.13	0.05	
LEP	1.66	0.49		4.17	0.97	
Free Lunch	-4.91	2.01	*	-0.34	0.11	
Middle Eastern	1.68	0.64		5.17	1.54	
Latino	-5.28	1.44		-4.69	1.01	
All Asian	3.37	1.27		10.51	3.12	*

* statistically significant at 0.05 level

The 11th grade cohort also posted statistically significant results in Reading during 2001 compared to the control group. Clark juniors scored approximately 3 NCEs higher compared to the control group after controlling for other explanatory factors (see Table 5.11). No statistically significant results were found among the 12th grade cohort. The lack of consistently significant results across years or grade level cohorts suggest that there is not a generalizable finding related to the influence of STC participation on reading achievement.

Table 5.11: 11th Grade Cohort, SAT-9 Reading (Model2 Regression)

SAT-9 READING	1999-00			2000-01		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.40	411		.35	411	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	15.66	4.76		37.43	10.58	
CLARK	0.05	0.04		3.24	2.05	*
G9 SAT-9 Math	0.58	14.12	*	0.31	7.07	*
Female	0.57	0.39		1.33	0.84	
LEP	-8.15	3.55	*	-16.90	6.85	*
Free Lunch	-3.34	1.91		-4.72	2.51	*
Middle Eastern	0.73	0.36		-7.01	3.25	*
Latino	1.83	0.54		-5.95	1.62	
All Asian	0.93	0.46		0.72	0.33	

* statistically significant at 0.05 level

Table 5.12: 12th Grade Cohort, SAT-9 Reading (Model 2 Regression)

SAT-9 READING	1998-99			1999-00		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.69	198		.73	198	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	9.99	2.94		10.66	3.42	
CLARK	-0.08	0.04		2.01	1.17	
G9 SAT-9 Math	0.81	16.63	*	0.81	18.22	*
Female	2.11	1.29		1.58	1.06	
LEP	-1.10	0.40		0.78	0.31	
Free Lunch	0.29	0.15		-0.67	0.37	
Middle Eastern	-0.35	0.17		-0.94	0.49	
Latino	-5.03	1.70		-1.81	0.67	
All Asian	1.59	0.75		4.41	2.26	*

* statistically significant at 0.05 level

No statistically significant results related to attendance at Clark Magnet High School were found for the Language, Social Studies or Science Stanford 9 subtests (See Tables 5.13-5.18). In other words, the differences between Clark students and the students in the control group were more likely to be affected by demographic and prior (9th grade) achievement factors than by participation in the STC programs and activities at Clark Magnet High School. The absence of statistically significant results for Social Science and Language was not surprising given that Clark is focused on other curricular areas. However, we were surprised by the lack of statistically significant results in Science as Clark has put science and technology at the forefront of its curriculum.

Table 5.13: 11th Grade Cohort, SAT-9 Language (Model 2 Regression)

SAT-9 LANGUAGE	1999-00			2000-01		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.39	411		.33	411	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	21.90	6.67		38.65	11.76	
CLARK	1.83	1.24		1.89	1.28	
G9 SAT-9 Math	0.57	13.95	*	0.33	8.05	*
Female	1.35	0.92		3.51	2.40	*
LEP	-9.86	4.30	*	-14.80	6.45	*
Free Lunch	0.40	0.23		-3.51	2.01	*
Middle Eastern	1.36	0.68		-1.22	0.61	
Latino	-4.55	1.34		-5.56	1.63	
All Asian	0.85	0.42		5.04	2.48	*

* statistically significant at 0.05 level

Table 5.14: 12th Grade Cohort, SAT-9 Language (Model 2 Regression)

SAT-9 LANGUAGE	1998-99			1999-00		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.61	198		.62	198	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	9.08	2.18		17.57	5.02	
CLARK	3.29	1.44		0.48	0.25	
G9 SAT-9 Math	0.87	14.58	*	0.77	15.33	*
Female	3.55	1.78		4.11	2.45	*
LEP	2.23	0.67		4.43	1.58	
Free Lunch	-2.60	1.08		-0.99	0.49	
Middle Eastern	3.78	1.46		4.34	1.99	*
Latino	-0.57	0.16		-0.63	0.21	
All Asian	-0.48	0.19		5.51	2.51	*

* statistically significant at 0.05 level

Table 5.15: 11th Grade Cohort, SAT-9 Social Studies (Model 2 Regression)

SAT-9 SOCIAL STUDIES	1999-00			2000-01		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.35	411		.53	411	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	19.50	5.16		55.18	14.05	
CLARK	2.60	1.54		1.56	0.88	
G9 SAT-9 Math	0.56	11.99	*	0.23	4.66	*
Female	-4.81	2.86	*	-3.95	2.26	*
LEP	-5.41	2.05	*	-15.23	5.56	*
Free Lunch	-3.51	1.75		-4.09	1.96	
Middle Eastern	-1.36	0.59		-7.51	3.13	*
Latino	-4.09	1.05		-3.68	0.90	
All Asian	-1.58	0.68		-0.59	0.24	

* statistically significant at 0.05 level

Table 5.16: 12th Grade Cohort, SAT-9 Social Studies (Model 2 Regression)

SAT-9 SOCIAL STUDIES	1998-99			1999-00		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.48	198		.52	198	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	19.93	4.66		28.69	6.94	
CLARK	-0.93	0.39		1.66	0.73	
G9 SAT-9 Math	0.67	10.99	*	0.72	12.18	*
Female	2.39	1.17		-4.03	2.03	*
LEP	-2.52	0.73		4.00	1.21	
Free Lunch	3.66	1.48		1.19	0.50	
Middle Eastern	-1.50	0.56		-1.95	0.76	
Latino	-5.29	1.42		-2.75	0.76	
All Asian	0.93	0.46		0.72	0.33	

* statistically significant at 0.05 level

Table 5.17: 11th Grade Cohort, SAT-9 Science (Model 2 Regression)

SAT-9 SCIENCE	1999-00			2000-01		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.42	411		.36	411	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	17.64	5.45		37.35	10.10	
CLARK	-0.73	0.50		2.06	1.24	
G9 SAT-9 Math	0.62	15.37	*	0.39	8.46	*
Female	-1.47	1.02		-2.06	1.25	*
LEP	-6.66	2.95	*	-11.33	4.39	*
Free Lunch	-0.07	0.04		-3.66	1.86	
Middle Eastern	-0.34	0.17		-9.33	4.14	*
Latino	-3.51	1.05		-7.51	1.96	
All Asian	-0.76	0.38		2.46	1.07	

* statistically significant at 0.05 level

Table 5.18: 12th Grade Cohort, SAT-9 Science (Model 2 Regression)

SAT-9 SCIENCE	1998-99			1999-00		
	Adjusted R-Square	N		Adjusted R-Square	N	
	.54	198		.53	198	
	Coefficient	T-Value		Coefficient	T-Value	
(Constant)	19.85	4.98		27.34	7.03	
CLARK	1.34	0.61		0.98	0.46	
G9 SAT-9 Math	0.69	12.08	*	0.61	10.97	*
Female	1.72	0.90		-0.74	0.40	
LEP	0.32	0.10		-2.56	0.82	
Free Lunch	-0.89	0.39		-1.02	0.46	
Middle Eastern	0.80	0.32		-2.04	0.84	
Latino	-6.63	1.91		-9.72	2.87	*
All Asian	3.02	1.21		1.92	0.78	

* statistically significant at 0.05 level

Grade Point Average

Regression analyses suggest that 11th Clark students "gain" about 0.2 GPA points compared to their GUSD high school counterparts in the control group. These results were significant at the .05 level. There were no statistically significant differences between the Clark and control group students in the 12th grade cohort. It is important to note the largest statistically significant regression coefficient was for female. Being female boosted GPA by approximately 0.3 (0.28 and 0.33) among both the 11th and 12th grade cohorts of students.

Table 5.21: 11th Grade Cohort, Cumulative GPA (Model 2 Regression)

CUMULATIVE GPA	2000-01		
	Adjusted R-Square	N	
	.21	411	
	Coefficient	T-Value	
(Constant)	2.03	13.90	
CLARK	0.18	2.75	*
G9 SAT-9 Math	0.01	6.23	*
Female	0.28	4.37	*
LEP	-0.29	2.85	*
Free Lunch	-0.04	0.46	
Middle Eastern	-0.08	0.88	
Latino	-0.35	2.30	*
All Asian	0.19	2.12	*

* statistically significant at 0.05 level

Table 5.22: 12th Grade Cohort, Cumulative GPA (Model 2 Regression)

CUMULATIVE GPA	2000-01		
	Adjusted R-Square	N	
	.31	198	
	Coefficient	T-Value	
(Constant)	1.94	11.14	
CLARK	0.08	0.80	
G9 SAT-9 Math	0.02	7.38	*
Female	0.33	3.90	*
LEP	-0.06	0.42	
Free Lunch	0.10	0.97	
Middle Eastern	0.15	1.35	
Latino	-0.14	0.91	
All Asian	0.13	1.22	

* statistically significant at 0.05 level

Course Credits Earned

Students at Clark were more likely to earn more course credits compared to the control group of GUSD non-STC students. On average, 11th graders at Clark earned nearly 25 more credits by the end of the 2000-2001 school year. Clark students in the 12th grade cohort earned nearly 13 more credits compared to their peers at other GUSD schools. Both of these results were significant at the .05 level. Other factors statistically significant in explaining differences in cumulative credits included gender (females earn more credits than males), Asian ethnicity, and prior (9th grade) achievement. These results are likely linked to Clark's block schedule which allows students to enroll in more courses during a school year.

Table5.23: 11th Grade Cohort, Cumulative Credits (Model 2 Regression)

CUMULATIVE CREDITS	2000-01		
	Adjusted R-Square	N	
	.38	411	
	Coefficient	T-Value	
(Constant)	163.85	36.97	
CLARK	24.62	12.40	*
G9 SAT-9 Math	0.23	4.15	*
Female	7.13	3.61	*
LEP	-5.09	1.64	
Free Lunch	-4.22	1.79	
Middle Eastern	2.06	0.76	
Latino	-4.59	1.00	
All Asian	11.01	4.01	*

* statistically significant at 0.05 level

Table 5.24: 12th Grade Cohort, Cumulative Credits (Model 2 Regression)

CUMULATIVE CREDITS	2000-01		
	Adjusted R-Square	N	
	18%	198	
	Coefficient	T-Value	
(Constant)	220.59	34.78	
CLARK	12.69	3.64	*
G9 SAT-9 Math	0.37	4.09	*
Female	6.99	2.30	*
LEP	2.87	0.56	
Free Lunch	3.20	0.87	
Middle Eastern	2.30	0.58	
Latino	-2.26	0.41	
All Asian	10.56	2.65	*

* statistically significant at 0.05 level

Attendance

Regular school day attendance was not significantly changed by attendance at Clark Magnet High School. For the 11th grade cohort, none of the factors included in the model yielded statistical significance. For Clark seniors in 2001, LEP status and Asian ethnicity were the only variables achieving statistical significance in terms of explaining differences in attendance patterns among Clark students and students in the GUSD non-STC control group.

Table 5.25: 11th Grade Cohort, Days of Attendance (Model 2 Regression)

ATTENDANCE	2000-01		
	Adjusted R-Square	N	
	-.01	409	
	Coefficient	T-Value	
(Constant)	180.00	2191.03	
CLARK	0.01	1.43	
G9 Attendance	0.00	0.09	
Female	0.01	1.14	
LEP	0.00	0.36	
Free Lunch	0.00	0.24	
Middle Eastern	0.00	0.27	
Latino	0.00	0.15	
All Asian	-0.01	1.35	

* statistically significant at 0.05 level

Table 5.26: 12th Grade Cohort, Days of Attendance (Model 2 Regression)

ATTENDANCE	2000-01		
	Adjusted R-Square	N	
	.08	185	
	Coefficient	T-Value	
(Constant)	183.86	9.57	
CLARK	2.72	0.89	
G9 Attendance	-0.07	0.70	
Female	2.91	1.14	
LEP	-15.14	3.84	*
Free Lunch	2.72	0.85	
Middle Eastern	4.99	1.52	
Latino	5.50	1.21	
All Asian	8.47	2.55	*

* statistically significant at 0.05 level

Postsecondary Eligibility

Using passage of Algebra II with a letter grade of "C" or better as a proxy for postsecondary eligibility, Clark students were much more likely to become eligible for admission to UC/CSU controlling for demographic and prior achievement factors. Clark students in the 11th grade in 2000-2001 were about 4.87 times more likely to pass Algebra II or a higher-level math course compared to students in the control group. The odds of a Clark 12th grade student passing Algebra II or higher courses were about 238 times as large as the odds of a student in the control group. Both 11th and 12th grade cohort results were statistically significant at the 0.05 level.

Table 5.27: 11th Grade Cohort, (Log) Likelihood of Passing Algebra II (Logistic Regression Model 2)

	Coefficient		S.E.	Sig.	Exponent (Coefficient)
(Constant)	-3.40	*	0.59	0.00	0.03
CLARK	1.58	*	0.24	0.00	4.87
G9 SAT-9 Math	0.04	*	0.01	0.00	1.04
Female	0.42		0.25	0.09	1.53
LEP	-0.05		0.40	0.90	0.95
Free Lunch	-0.44		0.28	0.12	0.64
Middle Eastern	-0.13		0.32	0.68	0.88
Latino	-0.19		0.56	0.74	0.83
All Asian	0.84	*	0.34	0.01	2.32

* statistically significant at 0.05 level

Table 5.28: 12th Grade Cohort, (Log) Likelihood of Passing Algebra II (Logistic Regression Model 2)

	Coefficient		S.E.	Sig.	Exponent (Coefficient)
(Constant)	-2.45		0.74	0.00	0.09
CLARK	0.87	*	0.40	0.03	2.38
G9 SAT-9 Math	0.04	*	0.01	0.00	1.04
Female	0.55		0.35	0.11	1.74
LEP	-1.11		0.65	0.09	0.33
Free Lunch	0.20		0.42	0.62	1.23
Middle Eastern	0.32		0.46	0.48	1.38
Latino	-0.17		0.60	0.78	0.85
All Asian	0.25		0.46	0.59	1.28

* statistically significant at 0.05 level

6. Interpretation of Results and Conclusions

At the outset of this report, we outlined four key research questions at the center of the California STC evaluation:

- What is the status of STC implementation in California?
- How has STC affected student preparation for postsecondary education and career entry?
- To what degree and in what ways has STC contributed to systemic change?
- Have STC principles penetrated the community deeply enough to be sustainable?

This section of the report aims to bring together much of the quantitative and qualitative research contained in the body of the report. The focus throughout is on contextualizing the main findings of the report by identifying possible explanatory quantitative and qualitative factors. Based on the quantitative and qualitative data compiled as part of this study, we are able to offer the following conclusions about the status of STC implementation at Clark Magnet High School as well as the relationship between STC and student and school outcomes. Where possible, we have sought to link our conclusions to the key research questions.

STC Participation and Influence on Student Outcomes

In the opening section to this report, we presented a review of the relevant literature regarding the success of career academies, a typical STC organizational strategy, and in improving key measures of student achievement. The research reviewed associated STC participation with the following student outcomes:

- Lower dropout rates
- Improved attendance rates
- Increased academic course taking
- Greater likelihood of earning course credits leading to on-time graduation
- Improved GPA

The descriptive and regression analyses presented in this report support some (but not all) of these conclusions about the academic benefits of participation in in-depth STC experiences while in high school.

Conclusion 1: Attendance at Clark is associated with improved student outcomes.

Compared to a control group of GUSD students not involved in extensive STC programs, students at Clark Magnet High School were more likely to accumulate course credits leading to graduation and to complete higher-level math courses leading to postsecondary eligibility. Clark students also tended to remain in school, with no dropouts recorded for the school in the last two years for which data are available.

Unlike previous research studies which have not linked improved standardized math and reading achievement test scores to STC participation, the results of this study indicate that Clark students scored better than the control group students on Stanford 9 Math after

controlling for demographic and prior achievement factors. These strong math results are likely linked to the school's eligibility requirements which require students to enter the school ready to enroll in Algebra or a higher level mathematics course. Nonetheless, the correlation between enrollment at Clark and Stanford 9 mathematics scores was statistically significant even after controlling for demographic characteristics that might be associated with higher test scores and 9th grade math achievement. This, in turn, suggests that curricular experiences which involve students in hands-on applications of mathematical reasoning during science courses and technology electives may have spillover benefits for student math achievement.

However, the fact that Stanford 9 Science scores were not higher among students at a magnet school specializing in science and technology suggests that the influence of STC principles is not generalizable across academic content areas. We are therefore reticent to attribute the gains in standardized test scores to the curricular experience at Clark.

Study Limitations

A key limitation of this study in terms of drawing definitive conclusions concerns the lack of a truly randomized experimental design. We were unable, for example, to compare the achievement of students attending Clark to those who had applied to the school but were not selected in the lottery process. We were simply unable to identify and access electronic data records for these students. As such, our research design could not incorporate the "natural" control group for comparison purposes.

Another limitations of the study hinged on our inability to disaggregate outcome results for different categories of students. Unlike the MRDC study referenced at the outset of this report, we were unable to classify students in the intervention (Clark) and control groups into high, medium and low risk groups. As MRDC study pointed out, the differences among these subgroups of students were often the most interesting and meaningful. Our inability to replicate this methodology derived from the relatively small amount of student data available on Clark students (i.e., there were only a few hundred students in the first two cohorts of students) as well as complications in obtaining data on Clark's students prior to high school entrance. Moreover, Clark's eligibility requirements (2.0 GPA, good behavior in middle school and readiness to enroll in Algebra) suggest that a truly high-risk group of students does not enroll at the school.

Cohort Differences

The data examined for this report suggest that the second cohort of students to attend Clark (juniors in 2000-2001) were more likely to accrue achievement benefits from participation at the school. Indeed, the 11th grade cohort included in the study was more likely to achieve results that were statistically significant compared to the control group. For example, findings associating Clark participation with higher student GPAs were statistically significant only among the Clark 11th grade cohort.

Qualitative research as well as the surveys conducted as part of this study suggest that the first cohort of students attending Clark was a somewhat anomalous group. School administrators and other stakeholders acknowledge that the first cohort of students was comprised of risk-taking "pioneers" willing to take a chance on a newly opened magnet

school rather than students necessarily attracted to the school's philosophical commitment to STC principles. In addition to the normal difficulties that might be associated with starting a new school (e.g., hiring staff, developing school facilities, creating a coherent school identity, etc.), Clark faced the added complication of infusing STC principles into the curriculum at the same time that it was developing the infrastructure to support STC. As a result, it is not an overstatement to say that the first cohort of students to graduate from Clark received an educational program less focused on STC than one focused on science and technology. Subsequent cohorts of students have arrived at a school that is clearer on what STC means in the context of the high school experience. In sum, the results for the initial graduating class of Clark students may be less generalizable to the current grade 9-12 student population attending the school.

STC Participation and Student Preparation for Postsecondary Education and Careers

In the research reviewed for this report, a number of qualitative gains were identified as spillover benefits of participation in in-depth STC experiences including:

- increased the level of interpersonal support for students
- improved school engagement (motivation to learn)
- increased participation in career awareness and work-based learning activities.
- increase in the number of vocational courses taken without reducing the likelihood of completing a basic core academic curriculum
- increased interest/intentions for postsecondary education

The qualitative research conducted as part of this study confirm most of these benefits of participation in a meaningful STC experience while in high school.

Conclusion 2: The curricular program at Clark provides students with access to increased opportunities for school- and work-based STC experiences than the overall District.

Clark's curricular program and organizational structure provide time for students to participate in project-based learning and career exploration, particularly during academic electives. Block scheduling reinforces school-based STC experiences by allowing students more time for hands-on applications of academic concepts. This schedule is not used at any other GUSD high school.

Regular exposure to outside speakers at Clark as well as the promotion of opportunities for students to participate in job shadowing and internships serve to promote STC goals of postsecondary and career preparation while making learning more relevant and fun for students at Clark. The requirement for a Senior Project (unique to Clark in GUSD) also provides a culminating experience for students that encourage both career exploration and the application of hands-on, project-based learning. In addition, graduation requirements at Clark (e.g., service learning and Senior Project) increase the likelihood of students participating in career exploration and work-based STC experiences. No other GUSD school requires a Senior Project.

While we do not have quantitative data documenting the number of work-based experiences at all GUSD high schools, qualitative research at the two GUSD control schools included in the study suggests that there is limited student participation in work-based learning outside of designated career academies. At the two GUSD high school involved in the CORE study, for example, most students experienced career exploration through a mandatory 9th grade Health and Guidance class.

On the other hand, based on the responses on the Senior Survey, career academies in GUSD may to be offering students more school- and work-based STC opportunities than Clark Magnet schools. More data collection related to the effectiveness of career academies in GUSD may be appropriate next step.

Conclusion 3: Clark's implementation of STC encourages preparation for postsecondary education.

The emphasis on providing students with access to school- and work-based STC experiences at Clark has gone hand-in-hand with an emphasis on postsecondary education. This is clearest in the follow-up survey data gathered from graduated seniors. Former Clark students were much more likely to enroll full-time in four-year colleges and universities compared to other GUSD students not involved in in-depth STC experiences while in high school. Despite indications that college preparation is emphasized at all GUSD high schools, graduates of Clark were much more likely to indicate intentions to obtain a baccalaureate or other advanced degree compared to students participating in regular comprehensive high school program in GUSD.

Extent of Systemic Change and Sustainability

Looking at the implementation of STC at Clark, it is possible to conclude that STC principles are integrated into the operation of the school. The focus on applied science and technology combined with the school's block schedule provide opportunities for students to participate in project-based learning. The requirement for a Senior Project also encourages career exploration and hands-on, project-based learning. Many, in addition, the level of District support for Clark as well as student and teacher participation in job shadowing and internships suggest that the school is actively attempting to link itself to the wider business and employer community. At the same time, the sustainability of STC as a long-term strategy is handicapped by low visibility/awareness of STC.

Conclusion 4: Most STC components are embedded into the curricular program at Clark but not always evident to students.

Although Clark appears to be firmly grounded in STC principles, the majority of Clark's students do not connect the school's programs, activities and curricular focus to STC components. This is most clear in student survey results which indicate that students do not identify with the STC "label" even when queried about participation in specific STC components. When STC is explained in more detail, students in interviews agreed that STC is present at the school (primarily in academic electives and extracurricular activities) but admitted that core academic classes do not sufficiently reinforce STC linkages and connections as a part of the regular curriculum. Instead, students experienced STC

elements during elective courses aimed at promoting hands-on applications of science, math and technological skills. In sum, there is limited evidence of overt STC curricular integration at Clark.

It appears that Clark has infused STC into the high school experience of its students without raising the profile of STC as a deliberate reform strategy, at least with the initial cohorts of students attending the school. Indeed, the results of the student surveys seem to indicate that most students did not feel that their high school experience involved exposure to STC programs and activities nor were the student survey respondents likely to identify benefits of participation in STC activities and programs. Moreover, student interviewees tended to say that they (and their parents) identified with the school's magnet label. Students attributed success in school to the nurturing learning environment provided by caring teachers. Students also said that they were motivated to come to school by access to state-of-the-art technology.

Based on these findings we conclude that Clark students are receiving a more muted exposure to STC elements through the lens of a school-wide focus on science and technology. In some respects, the school's designation as a magnet school serves to overshadow the STC principles which undergird the school. Students (and staff) consider STC to be a "regular" part of the school and are, therefore, less likely to view STC as something distinct and different. In this sense, Clark's whole school model of STC contrasts with the more typical school-within-a-school approach to STC embodied in career academies. Survey results indicate that academy students do, in fact, identify with the smaller learning communities organized around STC participation. Moreover, the survey results suggest that academy students were also more likely to view STC participation as beneficial both during and after high school.

Conclusion 5: Perceptions that Clark is not representative of GUSD may limit receptivity and extension of support for STC at other GUSD campuses.

The context for this evaluation derived, in part, from a desire to examine the degree to which Clark Magnet High School has been effective in improving student achievement using STC as a reform strategy. From the outset, the evaluation team was informed that some personnel at other GUSD schools attributed Clark's success to student demographic factors rather than the school's curricular program. As part of this study, the evaluation attempted to control for the school's demographic differences by selecting a control group of students similar to the student composition of the first two cohorts of students attending Clark. Compared to the control group, Clark students should positive outcomes in terms of coursetaking patterns, math test scores and postsecondary aspirations (see Conclusion 1). Nonetheless, the fact remains that Clark's student demographics depart from that of GUSD as a whole, leaving the school open to criticism regardless of the research findings. In particular, females and Hispanic/Latino students are underrepresented at Clark as well as LEP student subgroups. To some extent, these demographic characteristics may reflect the anomalous nature of the initial cohorts of students attending the school. Indeed, there is evidence that the school is consciously aware of the gender imbalance issues and has done a better job of attracting female students. While it is beyond the scope of this evaluation report to examine these issues in detail, we recommend that Clark, in conjunction with GUSD, carefully examine the school's student eligibility requirements and recruitment practices with an eye toward making Clark more representative of GUSD.