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TEXAS ACCELERATED SCIENCE ACHIEVEMENT PROGRAM: SUMMARY REPORT, 2008–2009

INTRODUCTION

The Texas Education Agency (TEA) initiated the Texas Accelerated Science Achievement Program (TXASAP) during the 2005–2006 school year and awarded a grant of $150,000 to Austin Independent School District (AISD) to use at Crockett, Lanier, and Reagan High Schools. For the 2007–2009 school years, TEA provided $160,000 for the second cycle of the grant, and Eastside Memorial High School (formerly Johnston) was included as an additional TXASAP school. The grant sought to improve students' grades in science courses to increase students' chances of graduating, and to increase 10th- and 11th-grade students' scores on the science portion of the Texas Assessment of Knowledge and Skills (TAKS). The grant was designed to support student groups (e.g., female and English language learning [ELL] students) who experienced an achievement gap in science. The grant also required that the intensive intervention programs be conducted outside of normal school hours, thereby supplementing existing activities. Student needs were to be the basis on which each campus determined the nature of its programs.

Program services varied at the four schools and included tutoring, field trips, peer mentors, science clubs, and a summer science institute. All four schools implemented program services during the fall and spring semesters of 2008–2009, and Crockett provided a summer school opportunity. Although the grant targeted students struggling academically, each school allowed additional students to participate if space was available. In the 2008–2009 school year and the preceding summer, almost 400 students participated in a TXASAP activity, according to reports from campus staff.

DESCRIPTION OF PROGRAMS

This section sets the stage by describing the 2008–2009 TXASAP programs at each participating school and the number of students who participated that year. This is followed by a methods section; a description of participant demographics and program results by campus; and a set of recommendations.

CROCKETT HIGH SCHOOL

Crockett programs included the Science Club, Science Pals, and a summer science institute, and served 124 students. Of the 117 students for whom data were available, 79 were female and 38 were male. The Science Club met every other week after school and organized

events and service projects. For example, Science Club members manned a booth at the 9th-grade orientation and made ice cream with liquid nitrogen for the incoming students and their parents. Students played science games, attended four environmental science lectures at the University of Texas at Austin, had movie nights, and took a field trip to the Body Worlds exhibit at the Houston Museum of Natural Science. The club involved 95 students, with about 15 to 25 attending each meeting. Science Pals involved 15 students and paired them so that high achievers could mentor their at-risk peers. These students attended events with the Science Club.

In Summer 2008, 30 9th- through 12th-grade students participated in Crockett's 2-week summer science institute, which focused on environmental science and allowed for integration of all science disciplines. The institute was designed to engage students in real-world field experiences, and accordingly, students visited and toured three state universities and conducted field experiments with university students and staff. Field experiences included water quality testing using macro-invertebrates with Texas State University in San Marcos, and aquatic science lessons with Texas A&M University at Corpus Christi. At St. Edward's University, students prepared research posters about a variety of environmental topics and presented them to parents, students, teachers, and professors. Guest speakers helped engage the students' interest, as well. Each student received a credit in Environmental Science upon completion of the institute. The demand for the summer program was high: more than 80 students applied to fill the 30 available spots.

Although funding for TXASAP activities ended in February 2009, Crockett staff obtained other funding to repeat the 2-week summer science institute in 2009, with 30 participants. Activities included collaborative science projects with Texas State University in San Marcos, Texas A&M University at Corpus Christi, and the University of Texas Marine Science Institute in Port Aransas. Students also visited a local landfill, went caving at Whirlpool Cave, and investigated renewable energy resources.

In addition to the student activities, TXASAP funding made it possible for Crockett to enhance its science curriculum by making existing lessons more inquiry based and by introducing manipulatives to help illustrate science concepts. Many lessons were redesigned to answer a testable question or to allow for student exploration before the teacher explained the scientific concept.

EASTSIDE MEMORIAL HIGH SCHOOL

Originally, campus staff at Johnston High School planned to use TXASAP funding to create two student organizations to meet after school and on Saturdays. One organization was to focus on robotics and the other on rocketry. However, in Fall 2008, the district closed Johnston High School and opened the building as a new school named Eastside Memorial High School. It took some time for teachers to plan and implement TXASAP activities for the school year, given the transition to the repurposed school, and students were required to receive other academic support services. As a result, the only TXASAP student program implemented was Saturday school tutorials, in which the 19 participants followed a curriculum designed to improve their performance on the science TAKS. Students participated for up to 10 hours for the school year.

Because of the low number of participants in the Saturday school tutorials, an analysis of program results was not completed for this school.

The primary focus of grant-supported activities was the improvement of teacher instruction in the classroom. Teacher leaders at Eastside who were funded by the TXASAP grant provided science teachers with intensive instructional coaching. Together, science teachers explored best practices in science instruction. They examined and analyzed student work and reviewed each other's lessons prior to implementing them in the classroom. All science classrooms began using a curriculum, purchased with TXASAP funds, that was developed by the Charles A. Dana Center at the University of Texas at Austin and incorporated hands-on laboratory and investigative activities.

LANIER HIGH SCHOOL

The Lanier program served 183 students, with some participating in more than one TXASAP-funded activity. Of the 172 students for whom data were available, 106 were female and 66 were male. Teacher leaders at Lanier, who were funded by the TXASAP grant, provided science course tutoring to 111 students. They also provided science TAKS tutoring, one program after school and another on Saturdays, to 61 students. The tutoring sessions involved a variety of instructional materials (e.g., the SMART board, game technology, lab equipment, and field guides) to engage students and support Texas Essential Knowledge and Skills (TEKS) objectives.

Lanier also implemented a field experience program that served 22 students. The program targeted at-risk female students, who participated in field trips and enrichment activities designed to improve their grades and build their interest in continuing science studies. Participants visited the Houston Natural History Museum, the Dallas Art Museum, and the McDonald Observatory in Fort Davis.

REAGAN HIGH SCHOOL

Reagan served 91 students with TXASAP funds. The 31 students in the Chemistry Book Club used chemistry novels purchased through the TXASAP grant in their club activities. Sixty-one students went on field trips to the IMAX theater to view movies related to science. Forty-two students participated in a credit recovery program in which they earned lost course credits in biology, chemistry, or integrated physics and chemistry, and eight students participated in science TAKS tutoring after school. Reagan had proposed to provide summer activities; however, the school was chosen as a summer school site for the district, and the dedication of resources to this endeavor prevented campus staff from implementing the proposed TXASAP summer activities.

Staff at Reagan also used TXASAP funds to improve the science curriculum with the purchase of Kagan Cooperative learning materials and strategies. The materials supported hands-on and inquiry-based learning and were used in classrooms to enhance mastery of the subject, improve thinking skills, build teams, and increase student engagement. The chemistry novels also were used in science classrooms to support instruction.

METHODS

EVALUATION OBJECTIVES

The purpose of TXASAP was to improve science academic achievement. To measure such improvement, this evaluation examined TAKS science test scores and passing rates, and science course grades. The summer science institute at Crockett also had the objective of improving student attitudes about science, so attitude surveys and focus group data were examined for that group. In combination, these measures provide decision makers with the information necessary for making future program implementation decisions to improve student science achievement.

EVALUATION QUESTIONS

The report focuses on answering three questions:

1. What were the demographic characteristics of the students served by the grant?
2. Did each campus reach the student population targeted by the grant; namely, students with low science achievement, especially those belonging to a demographic group that experienced an achievement gap in science?
3. How did participants' science achievement compare with that of nonparticipants?

DATA COLLECTION

Both quantitative and qualitative data were collected for this evaluation. Each TXASAP campus provided program participation data. However, the program participation data provided by the campuses varied in quality. Although attempts were made to correct them, errors in these data prevented some student data from being included in the analyses. District student information systems were used to provide demographic, TAKS science test, and science course data. Crockett's summer science institute participants completed a science attitude survey after the program. The survey asked questions regarding the students' opinion about the importance of science, the students' ability to understand and do well in science courses, and whether the students thought science was interesting. The summer students also participated in student focus groups to help identify important outcomes of the institute.

DATA ANALYSIS

This evaluation used a mixed-methods approach. Qualitative information from state progress reports, communication with campus contacts, and focus groups were analyzed to describe program implementation and impact. For the quantitative analyses, program participation data from the campuses were merged with student records. Descriptive statistics were calculated for demographic, science grade, and science TAKS data. Tests of proportions were used to compare participant demographics with the demographic characteristics of all students at each campus. These tests indicated whether a significant difference, not caused by chance, existed between the percentage of participants with a particular characteristic and the percentage of all students at the campus with the same characteristic.

Statistical tests for significance were conducted on participant and nonparticipant data to determine possible program impact on student science course grades, and science TAKS scores

and passing rates. The analysis also investigated possible program impact on academic progress by including a comparison of the change in average grades from the 2007–2008 to the 2008–2009 school years for both participants and nonparticipants. This year-to-year analysis did not include all students because some did not attend a school in AISD both years, and most students who were freshmen in 2008 attended middle school in 2007. A comparison of science grades from middle school and high school would not be valid.

The analysis of academic progress did not include a comparison of science TAKS passing rates and scores from one year to the next because the science TAKS was only taken by 10th and 11th graders. Therefore, only students who were 11th graders in 2008 and attended a school in AISD both years would have science TAKS results for both years. This group of students would be a small subset of the whole and would not necessarily represent all students.

LIMITATIONS

This study is subject to limitations. Whenever programs do not randomly select participants and students may choose whether or not to participate, a selection bias is introduced into program analyses. In the case of TXASAP participants, students could have chosen to participate for a variety of reasons, potentially making them substantively different from the other students in their school. Additionally, some analyses included small sample sizes (i.e., less than 30), and this may have reduced the precision of the statistical procedures. Therefore, the results of this study should be interpreted with caution.

PARTICIPANT DEMOGRAPHICS AND PROGRAM RESULTS, BY CAMPUS

Described in this section of the report are the ranges of participant hours during the 2008–2009 school year, differences between TXASAP participants and nonparticipants at each campus in terms of demographics and academic achievement in the 2008–2009 school year, and changes in student academic achievement from 2007–2008 (pre-program) to 2008–2009. An achievement gap, as measured by comparing the Spring 2009 science TAKS scores at each campus for a specific student group and for students not in that group, existed at all three schools for the following student groups: female, ELL, and special education. Hispanic and Black students at each school demonstrated a science achievement gap as measured by comparing their science TAKS scores with those of White students.

CROCKETT

Demographics and Hours of Participation

The demographics of program participants were examined in relation to the school's population. The demographics of summer institute participants did not differ significantly from the demographics of Crockett students the following school year. However, a significantly higher percentage of female students participated in the TXASAP programs at Crockett during the regular school year, compared with the percentage of all female students at the school (i.e., 68% in TXASAP programs, compared with 47% in the school population). Thus, the program was considered to have reached a group of students who experienced an achievement gap in science.

However, as Table 1 demonstrates, a significantly lower percentage of ELL and special education students participated in the program during the school year, compared with the percentages of these groups in the school population. These student groups also experienced a science achievement gap. In terms of race/ethnicity, the program during the school year served a significantly lower percentage of Hispanic students and a significantly higher percentage of White students, compared with the percentages of these groups in the school population.

Table 1. Demographic Characteristics of Crockett Students, by Texas Accelerated Science Achievement Program (TXASAP) School-year Participation

Demographic characteristic	Percentage of TXASAP school-year participants (*n* = 91)	Percentage of all Crockett students (*n* = 1,472)
Male*	31.9 ↓	52.6
Native American	0.0	0.4
Asian	2.2	1.2
African American	9.9	10.9
Hispanic*	53.9 ↓	66.9
White*	34.1 ↑	20.7
English language learner*	4.4 ↓	12.7
Special education*	4.4 ↓	16.8
Economically disadvantaged	56.0	61.1

Source. AISD student enrollment files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Denotes a statistically significant difference in percentages of TXASAP and all Crockett students, at $p < .01$

The number of hours students participated in the programs varied (Table 2). Students in the summer institute participated for 70 hours. The students who participated during the regular school year participated for between 1 and 25 hours.

Table 2. Hours of Texas Accelerated Science Achievement Program (TXASAP) Participation of Crockett Non-summer Students

1 to 5 hours	6 to 10 hours	11 or more hours
43%	33%	24%

Source. Campus TXASAP participation files, prepared by Department of Program Evaluation

Science Grades

Science course grade averages for the 2008–2009 school year were examined for TXASAP program participants, compared with grade averages for nonparticipants. Summer institute participants had significantly higher grades the following fall and spring semesters than did nonparticipants (Table 3). In fact, almost all participant categories had significantly higher average grades, compared with the averages grades for nonparticipants.

Table 3. Science Grades at Crockett in 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average fall grade 2008–2009	Average spring grade 2008–2009
Summer science institute (*n* = 26)	81.6* ↑	81.8* ↑
All fall (*n* = 64)	84.3* ↑	78.8* ↑
Fall only (*n* = 35)	82.5* ↑	75.1
Fall and spring (*n* = 29)	86.4* ↑	83.7* ↑
All spring (*n* = 46)	83.8* ↑	82.0* ↑
Spring only (*n* = 18)	79.2	79.3
Nonparticipants (*n* = 1,250)	76.0 ↓	73.0 ↓

Source. AISD student course enrollment and grade files and campus TXASAP participation files, prepared by Department of Program Evaluation
Note. Three summer science institute students participated during the school year. They are included only in the calculations for the summer science institute.
* Significantly different from nonparticipant grade at $p < .05$

However, the semester before TXASAP program participation, both summer and regular school year participants had significantly higher average science grades than did nonparticipants, with the exception of students who only participated in the spring semester. Thus, it appears the program attracted many students who already were doing better in science than were their peers. Therefore, any significant post-program grade differences between participants and nonparticipants might not be considered a result of the program. Rather, higher achieving students who chose to be in the program might have continued to obtain higher science grades, compared with nonparticipants, whether these higher-achieving students had participated in TXASAP programs or not.

Science course grades were examined across school years for participants and nonparticipants (Table 4). Most average science grade changes from year to year were not found to be significant. Thus, indications of program influence on academic progress were not evident. The significant decrease in spring grades from year to year for fall participants may indicate that any impact the program might have had on fall participants did not appear to have carried over to the following semester.

Table 4. Changes in Science Grades of Crockett Students From 2007–2008 to 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average pre-program grade Fall 2007-2008	Difference in average fall grades pre- to post-program, 2007–2008 to 2008–2009	Average pre-program grade Spring 2007-2008	Difference in average spring grades pre- to post-program, 2007–2008 to 2008–2009
Summer science institute (*n* = 26)	81.0	0.1	80.3	1.01
All fall (*n* = 53)	84.0	-0.3	83.2	-5.6* ↓
Fall only (*n* = 35)	83.2	0.1	82.1	-6.8* ↓
Fall and spring (*n* = 19)	85.7	-1.0	85.5	-3.5
All spring (*n* = 32)	84.8	-2.7	83.0	-2.2
Spring only (*n* = 14)	84.1	-5.4	80.1	-0.9
Nonparticipants (*n* = 836)	76.8	0.0	74.2	.2

Source. AISD student course enrollment and grade files and campus TXASAP participation files, Department of Program Evaluation
Note. Three summer science institute students participated during the school year. They are included only in the calculations for the summer science institute.
* Significant at $p < .05$

Science TAKS

Academic achievement also was measured by performance on the TAKS science test. Tables 5 and 6 compare the 2008–2009 TAKS science test scores and passing rates of TXASAP participants and nonparticipants. The science TAKS scores of both summer and school year TXASAP participants were significantly higher than were the scores of nonparticipants; however, the passing rate was only significantly higher for summer participants.

Table 5. Crockett Science TAKS Results 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Summer Participation

	Mean TAKS science scale score	TAKS science passing rate
Summer science institute participants (*n* = 26)	2260* ↑	88.5%* ↑
Nonparticipants (*n* = 643)	2166	70.3%

Source. AISD student TAKS files and campus TXASAP participation files, prepared by Department of Program Evaluation
Note. This analysis includes all versions of the science TAKS.
* Significantly different from nonparticipant values, at $p < .05$

Table 6. Crockett Science TAKS Results 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) School-year Participation

	Mean TAKS science scale score	TAKS science passing rate
TXASAP school-year participants (*n* = 40)	2250* ↑	82.5%
Nonparticipants (*n* = 585)	2180	72.5%

Source. AISD student TAKS files and campus TXASAP participation files, prepared by Department of Program Evaluation
Note. Students who participated in the summer science institute are not included among school-year participants. The versions of the science TAKS that were modified or adapted for special education students are not included in the school year analysis to reduce bias because a significantly lower percentage of TXASAP participants than of the general student population were special education students.
* Significantly different from nonparticipant value at $p < .05$

Gender and the Science TAKS

This section takes a preliminary look at what role gender played in student outcomes, considering the grant goal of including population groups that experienced an achievement gap in science. The analysis is preliminary because the small sample sizes and pre-program differences in science achievement between participants and nonparticipants preclude reaching definitive conclusions.

For students participating in the program during the school year, significant differences existed in academic achievement between participants and nonparticipants when gender was considered. Of the 15 male participants, 100% passed the science TAKS in Spring 2009, compared with 78% of male nonparticipants; this difference was significant. Although a higher percentage of female participants (72%) than of female nonparticipants (66%) passed the test, the difference was not significant. The same pattern occurred with science TAKS scores. The significant difference in TAKS science scale scores between male participants (2355) and male nonparticipants (2200) was 155 points. Although female participants had higher scores (2187) than did female nonparticipants (2158), the difference was not significant.

For the students participating in the summer science institute in 2008, no significant differences existed in passing rates between participants and nonparticipants, when separated by gender. However, the nine male students who participated in the summer program had significantly higher science TAKS scores (2338) than did male nonparticipants (2187). The 17 female summer participants had higher scores (2218) than did female nonparticipants (2151), but the difference was not significant.

Summer Science Institute – Student Feedback

Students took a science attitude survey at the end of their participation in the 2008 summer science institute. Almost every student thought that being a scientist would be exciting (23 of 26, or 88%), and 96% thought science was fun. Students indicated an interest in scientific ideas not taught in school and had confidence in their ability to succeed in future science courses.

Students participating in the institute the following summer exhibited a similar level of enthusiasm about the summer activities and science in general. In the two focus groups, students stated that they particularly enjoyed going caving and testing water quality. They mentioned facts they had learned on their trips and thought the knowledge they gained would serve them in the future because they were "learning how to make the city and the state better." Both groups of students, when asked what they would tell their friends about the institute, said they would tell them it was fun. Some students said the reason they participated was to get the science credit; however, many students said they would participate in the institute again, even if they did not get credit.

Students were asked about aspects of the program they would change. They complained they did not have anything to do over the summer, and could only participate once in the summer science institute. One student suggested former participants be allowed to participate again as junior counselors to help other students.

Crockett TXASAP Results Summary

The intent of the TXASAP program was to target students who were struggling to improve their academic achievement in science. The programs at Crockett included one group (i.e., female students) that experienced an achievement gap in science. However, it appears that the program did not focus on or could not recruit other student groups that also experienced this gap.

The students in the summer science institute participated for the largest number of hours and appeared to have the best academic outcomes compared with school-year participants. However, both summer and school year participants had significantly higher grades than did nonparticipants the semester before they entered the program, indicating that the program generally attracted high achievers, rather than students struggling academically in science. This makes any comparison of outcomes for participants and nonparticipants suspect because it is not possible to know whether the positive outcomes of participants occurred as a result of the program or whether the same results would have occurred in the absence of the program.

The preliminary look at possible program impacts by gender indicated that the gap in TAKS scores and passing rates between participants and nonparticipants was much larger for male students than for female students. Further study is needed with larger sample sizes, and controlling for pre-program differences and selection bias, to see whether the program has a greater influence on male participants than on female participants. Attitude surveys in 2008 and focus groups in 2009 with the summer science institute participants indicated they thoroughly enjoyed their experience and were enthusiastic about science.

LANIER HIGH SCHOOL

Demographics and Hours of Participation

The demographics of program participants were examined in relation to the school's population (Table 7). Lanier's programs had a higher percentage of female students than did the school's student population. No other significant demographic differences existed between TXASAP participants and nonparticipants.

Table 7. Demographic Characteristics of Lanier Students, by Texas Accelerated Science Achievement Program (TXASAP) Participation

Demographic characteristic	Percentage of TXASAP participants (*n* = 172)	Percentage of all Lanier students (*n* = 1,348)
Male*	38.4 ↓	51.1
Native American	0.0	0.3
Asian	2.9	2.3
Black	9.9	12.5
Hispanic	81.4	79.6
White	5.8	5.3
English language learner	32.4	33.3
Special education	9.4	12.8
Economically disadvantaged	85.3	85.4

Source. AISD student enrollment files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Denotes a statistically significant difference in percentages of TXASAP and all Lanier students, at $p < .01$

The hours of participation in TXASAP for the school year ranged from 1 to 68; however, about 80% of TXASAP participants at Lanier participated for 5 or fewer hours. The remaining 20% were split almost evenly between 6 to 10 hours and 11 to 68 hours of participation. Field trips accounted for the large number of hours for some participants. For instance, one trip to Fort Davis and the McDonald Observatory took 57 hours.

Science Grades

For the 2008–2009 school year, science course grade averages were examined for TXASAP program participants and compared with science course grade averages for nonparticipants. In Spring 2008, prior to participation in the 2008–2009 program, no significant difference existed in the average grades of participants and nonparticipants. As Table 8 demonstrates, no significant difference existed in the average grades of TXASAP participants and nonparticipants after the first semester of the program in Fall 2008, either. However, the following spring, the students who had participated during the fall had significantly higher grades than did nonparticipants, regardless of whether they also participated during the spring.

Table 8. Science Grades of Lanier Students in 2008–2009 by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average fall grade 2008-2009	Average spring grade 2008-2009
All fall (*n* = 116)	72.3	72.7* ↑
Fall only (*n* = 105)	72.0	72.0* ↑
Fall and spring (*n* = 11)	75.7	79.8* ↑
All spring (*n* = 24)	72.0	73.0
Spring only (*n* = 13)	68.9	67.3
Nonparticipants (*n* = 1,038/1,135)	70.1	67.2

Source. AISD student course enrollment and grade files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Significantly different from nonparticipant grade, at $p < .05$

Science course grade averages also were examined across the 2007–2008 and 2008–2009 school years for TXASAP participants and nonparticipants (Table 9). Students who participated in TXASAP in Fall 2008 had significantly higher grade averages that fall than they did in Fall 2007. That was not the case for nonparticipants. The fall grade averages of nonparticipants increased less than a point from 2007 to 2008. Also, nonparticipants experienced a significant decrease in their Spring 2009 grades, compared with their Spring 2008 grades. Although fall TXASAP participants experienced a drop in spring grade averages, compared their grade averages with the previous year, the decrease was not significant. In fact, no significant differences existed in spring grades for any participant group.

Table 9. Changes in Science Grades of Lanier Students From 2007–2008 to 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average pre-program grade Fall 2007-2008	Difference in average fall grades pre- to post-program, 2007–2008 to 2008–2009	Average pre-program grade Spring 2007-2008	Difference in average spring grades pre- to post-program, 2007–2008 to 2008–2009
All fall (*n* = 64)	69.5	4.2* ↑	74.8	-2.5
Fall only (*n* = 54)	69.0	4.5* ↑	74.5	-3.6
Fall and spring (*n* = 10)	72.9	2.4	76.6	3.1
All spring (*n* = 22)	69.4	2.1	72.8	1.6
Spring only (*n* = 12)	66.8	1.9	69.6	0.3
Nonparticipants (*n* = 650/687)	71.0	0.1	70.3	-2.9* ↓

Source. AISD student course enrollment files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Significant at $p < .05$

Science TAKS

Academic achievement also was measured by student performance on the TAKS science test. As Table 10 demonstrates, no significant difference existed between TXASAP participants' and nonparticipants' science TAKS scores in the 2008–2009 school year. However, participants passed the test at a significantly higher rate than did nonparticipants.

Table 10. Lanier Science Texas Assessment of Knowledge and Skills (TAKS) Results 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Mean TAKS science scale score	TAKS science passing rate
Participants (*n* = 47)	2164	76.6%* ↑
Nonparticipants (*n* = 486)	2121	58.4%

Source. AISD student TAKS files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Significantly different from nonparticipant rate, at $p < .05$

Science TAKS and Gender at Lanier

Gender was considered in the outcomes of students participating in the program. The 31 female students who participated in TXASAP and took the TAKS science test in Spring 2009 had a significantly higher passing rate than did the female students who did not participate in the program. The passing rate for female participants was 81%, compared with a 55% passing rate for female nonparticipants. No significant difference existed between female participants (2,154) and

nonparticipants (2,112) with respect to science TAKS scale scores, and no significant difference existed between male participants and male nonparticipants for either TAKS measure.

Lanier TXASAP Results Summary

The results for the program at Lanier should be considered carefully. By focusing the program on female students, Lanier succeeded in serving a student group that experienced a science achievement gap. However, 80% of participation in the program was for 5 or fewer hours. Within this context, Lanier's fall program participants had significantly higher spring grades, compared with the grades of their nonparticipating peers, and they experienced an increase in average grades from Fall 2007 to Fall 2008. Because no significant differences existed with respect to grades for participants and nonparticipants prior to the program, it is possible that this progress in academic achievement was influenced by the program. The science TAKS results demonstrate that the higher passing rates of participants, compared with the passing rates of nonparticipants, in 2008 possibly could be attributable to the program. However, another element that could have had an impact on achievement results was selection bias. The positive achievement outcomes of participants possibly could be attributable to the student characteristics that influenced their decision to participate.

REAGAN HIGH SCHOOL

Demographics and Hours of Participation

Significant demographic differences existed between TXASAP participants and the general student population at Reagan. As demonstrated in Table 11, a significantly higher percentage of African American students and a significantly lower percentage of Hispanic students participated in TXASAP, compared with the percentages of these groups within the general student population. Both groups experienced a science achievement gap, as measured by the science TAKS. Also, a significantly lower percentage of special education and ELL students participated in TXASAP, compared with the percentages of these groups within the general student population.

Students at Reagan participated in TXASAP from between 1 and 29 hours. About 96% of the students participated for 10 or fewer hours (i.e., 49% from 1 to 5 hours, and 47% from 6 to 10 hours). The remaining 4% of students participated for more than 10 hours.

Table 11. Demographic Characteristics of Reagan Students, by Texas Accelerated Science Achievement Program (TXASAP) Participation

Demographic characteristic	Percentage of TXASAP participants (*n* = 89)	Percentage of all Reagan students (*n* = 777)
Male	51.7	52.4
Asian	0.0	0.3
African American*	39.3 ↑	28.1
Hispanic*	60.7 ↓	69.0
White	0.0	2.7
English language learner*	25.8 ↓	35.9
Special education*	5.6 ↓	14.7
Economically disadvantaged	84.3	87.5

Source. AISD student enrollment files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Denotes a statistically significant difference in percentages of TXASAP and all Reagan students, at $p < .05$

Science Grades

Science course grade averages were examined for TXASAP program participants and compared with science course grade averages for nonparticipants. Students who participated in TXASAP in the spring semester had grades significantly higher than did nonparticipants (Table 12). However, their pre-program grades from the previous fall semester also were significantly higher than were the fall grades of nonparticipants. Thus, the significantly higher spring grades of spring participants cannot necessarily be attributed to the program.

Table 12. Science Grades of Reagan Students in 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average fall grade 2008-2009	Average spring grade 2008-2009
All fall (*n* = 36)	74.5	72.7
Fall only (*n* = 26)	74.1	71.5
Fall and spring (*n* = 10)	75.4	76.0
All spring (*n* = 58)	74.8* ↑	75.4* ↑
Spring only (*n* = 48)	74.7* ↑	75.3* ↑
Nonparticipants (*n* = 589/659)	70.9	68.8

Source. AISD student course enrollment and grade files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Significantly different from nonparticipant grade, at $p < .05$

Science course grade averages also were examined across the 2007–2008 and 2008–2009 school years for TXASAP participants and nonparticipants, and the results were mixed. Nonparticipants experienced a significant decline in year-to-year average grades for both semesters (Table 13). Spring TXASAP participants did not experience a significant decline in grades during the semester they participated. However, students who participated only in the fall had a significant grade decrease each semester, and this grade decrease was larger than that of nonparticipants.

Table 13. Changes in Science Grades of Reagan Students From 2007–2008 to 2008–2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Average pre-program grade Fall 2007-2008	Difference in average fall grades pre- to post-program, 2007–2008 to 2008–2009	Average pre-program grade Spring 2007-2008	Difference in average spring grades pre- to post-program, 2007–2008 to 2008–2009
All fall (*n* = 32)	78.2	-3.0	78.3	-5.4* ↓
Fall only (*n* = 24)	79.6	-4.6* ↓	79.5	-7.5* ↓
Fall and spring (*n* = 8)	73.4	2.0	74.6	.75
All spring (*n* = 56)	78.3	-3.4* ↓	75.1	-1.0
Spring only (*n* = 48)	79.1	-4.3* ↓	75.1	-1.3
Nonparticipants (*n* = 368/390)	74.4	-3.6* ↓	71.4	-2.5* ↓

Source. AISD student course enrollment and grade files and campus TXASAP participation files, prepared by Department of Program Evaluation
* Significant at $p < .05$

Science TAKS

Academic achievement also was measured by student performance on the TAKS science test. TXASAP students had higher science TAKS scale scores and passing rates than did nonparticipants in the 2008–2009 school year; however, only the difference in passing rates was significant (Table 14).

Table 14. Reagan Science TAKS Results 2009, by Texas Accelerated Science Achievement Program (TXASAP) Participation

TXASAP participation	Mean TAKS science scale score	TAKS science passing rate
Participants (*n* = 64)	2100	54.7* ↑
Nonparticipants (*n* = 261)	2070	40.6

Source. AISD student TAKS files and campus TXASAP participation files, prepared by Department of Program Evaluation
Note. The science TAKS versions modified or adapted for special education students are not included in the school year analysis because the percentage of special education students was significantly lower among TXASAP participants than among the general school population.
* Significantly different from nonparticipant rate, at $p < .05$

Reagan TXASAP Results Summary

TXASAP participants at Reagan were significantly different demographically from nonparticipants. The percentage of African American students (i.e., a group that experienced an achievement gap) in the program was higher than the percentage of African American students in the general school population. Other student groups that also experienced a science achievement gap were underrepresented among participants.

It is unclear whether the program helped improve the academic achievement of its participants. The students who had better average science grades after participating in the program also had higher average grades than did nonparticipants before the program. This pre-program discrepancy could explain the higher TAKS science test passing rate of participants, compared with that of nonparticipants. Selection bias also could have played a role in participant outcomes because making the choice to be in the program distinguished participants in some unmeasured way from students who did not so choose. Academic achievement could be explained as resulting from this distinction.

Although participants had higher average TAKS science scores than did nonparticipants, the average science TAKS score for participants was only 2100, the minimum score considered as passing. The 55% passing rate of participants was low, compared with passing rates at other TXASAP schools. So, although participants were doing comparatively better in science than were their peers before the program, they still could be considered low achieving.

CONCLUSION

Program results were mixed. For the most part, participants at the three schools had better academic outcomes than did nonparticipants; however, at two of the schools, participants appeared to have been doing better academically than nonparticipants before the program. At these two schools, no academic progress between school years was evident. In the case of Lanier, the one school in which no pre-program grade differences existed, the program may have influenced the positive academic outcomes. However, the low number of participation hours and selection bias make it unlikely that the program was a major factor in creating the positive outcomes. Overall participation hours were low in number for most of the students. However,

students did report interest in and enjoyment of the summer hands-on field-experience activities at Crockett. Developing students' interest in science may influence their motivation to learn and subsequently their science achievement.

RECOMMENDATIONS

Results were inconclusive with respect to whether the TXASAP programs implemented at each school helped improve students' academic achievement. To make it possible to determine the effectiveness of the science programs, the following steps are recommended:

1. Efforts should be made to include more students who underachieve in science. The TXASAP programs attracted some students who, on average, already were doing better than their peers in science. The success of these students is important; however, if the goal of the program is to improve the science achievement of low-performing students, greater efforts should be made to include students who meet that criterion.
2. Efforts should be made to increase the number of participants and their hours of participation at each school. An analysis of results by each program at an individual campus, using data from programs and schools with sufficient numbers of participants for meaningful analysis, might yield best practice information for future science improvement endeavors.
3. Future programs should develop and implement strategies specifically designed to reach student populations (e.g., ELL and special education students) who experience a science achievement gap so these students have an opportunity to participate in science enrichment activities.