Evidence of Effectiveness of *PLATO Online Secondary Solutions* on Student Achievement and College and Career Readiness

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September 2010

Table of Contents

1.0 Summary

The Cypress-Fairbanks ISD and PLATO Learning The Cypress-Fairbanks Independent School District (hereafter, "Cy-Fair") is the third largest district in Texas. Beginning in 2008, Cy-Fair made *PLATO Online Secondary Solutions* part of the district's assistance to students who were at risk of not completing secondary school.

Comprehensive gains in course grades The district provided teacher-assigned course grades for the academic year 2007–08 as well as for the academic year 2008–09, when at-risk students began using *PLATO Online Secondary Solutions* on the PLATO Learning Environment (PLE). Student performance for the two academic years was compared in the subjects that students repeated. In **all content areas**, students earned significantly higher course grades when using *PLATO Online Secondary Solutions* than they did in the previous academic year.

After using PLATO Learning courseware to retake the same course that they had previously failed, students earned, on average, grades that were 17 points higher (on a 100 point scale). Of the Cy-Fair students who failed a course in 2008 and then retook it in 2009 using *PLATO Online Secondary Solutions*, 84 percent completed and passed the course the second time.

Academic subjects that are often obstacles to high school graduation—Algebra and English, for example—consistently had strong performance gains. And those gains came from students who had not previously done well in the courses.

Gains in pre- and post-course assessments PLATO Learning's computer-related assets support finely grained testing to determine what a student knows and needs to know (the pretest) and then what they have learned (the posttest). For each of the core curriculum content areas—English, Algebra, Physics, History, etc.—students scored significantly higher on the post-course assessment when compared to the pre-course assessment.

The performance of limited-English proficient (LEP) students As indicated by the teacher-assigned grades, LEP students had even stronger performance gains than other *PLATO Online Secondary Solutions* students over the two academic years examined in this analysis.

Student improvement disaggregated by ethnicity, gender, and at-risk classification All groups, no matter what their ethnicity, gender, or at-risk classification, improved their average performance year after year. The similarity of the gains across the groups suggests that *PLATO Online Secondary Solutions* is able to equally help **all students** learn across both semesters of the academic year.

Evaluation of PLATO Learning by Cy-Fair graduates and teachers who used *PLATO Online Secondary Solutions* To measure the attitudes and opinions of students who used *PLATO Online Secondary Solutions* to help them graduate in 2009, a Web-based survey was developed. Approximately 5,000 individuals identified by the district as 2009 graduates were invited to participate. Of the 852 respondents, 55 (7 percent) indicated that they used *PLATO Online Secondary Solutions* in high school. These 55 graduates had positive opinions about the usefulness of the program,

with 90 percent agreeing that the program was "very helpful" or "helpful." When asked if they thought *PLATO Online Secondary Solutions* helped them graduate, 62 percent of the respondents replied "Yes."

Seventy-five percent (41) of the graduates who reported using *PLATO Online Secondary Solutions* in high school said that they are enrolled in college-level courses. Of those forty percent attend a four-year university, 27 percent attend a community college, and 9 percent take courses at a vocational/trade school. These responses demonstrate that a majority of the Cy-Fair graduates who were not previously successful academically and used *PLATO Online Secondary Solutions* in high school to recover credits went on to pursue a college degree after graduation.

Teachers who used *PLATO Online Secondary Solutions* to help their students recover high school credits during the 2008–09 academic year also received the survey. The 12 teachers who responded agreed unanimously that these students were more successful than in their previous years of schooling. They also noted that the students preferred PLATO Learning's online courses to paper-and-pencil materials.

Conclusion Cy-Fair used PLATO Learning's rigorous and engaging research-based courses to support their teachers' work with the district's most challenging group of high school students. Those students who had not previously been successful at core curriculum topics improved their performance as measured by both teacher-assigned course grades and PLATO Learning's finely grained pre- and post-assessment indicators. The efficacy of *PLATO Online Secondary Solutions* extended to the district's population of LEP students, at-risk students, and students of various ethnic backgrounds. Most students who used the courseware in 2008–09 agree that it helped them graduate. And their teachers agreed unanimously that students were more successful with *PLATO Online Secondary Solutions* than with their previous schooling.

2.0 PLATO's Online Secondary Solutions

The *PLATO Online Secondary Solutions* package targets students who may not otherwise be successful in school. It decreases the likelihood that they will leave school early and increases the chance that they will graduate. Both outcomes contribute to the success of the graduates' transition to positive post-secondary engagement (paid employment, employment training, or other further study, including college-level courses).

PLATO Online Secondary Solutions emphasizes tiered instruction. That is, a student's learning is matched to what they already know and what they need to learn next. During Cy-Fair's 2008–09 academic year, *PLATO Online Secondary Solutions* addressed remediation and credit recovery needs via access to PLATO-designed courses on the subjects of Algebra, Biology, Chemistry, English, Geometry, Integrated Physics and Chemistry, U.S. History, World Geography, and World History. Cy-Fair also customized some courses to address specific local curriculum priorities.

3.0 Cypress-Fairbanks ISD and *PLATO's Online Secondary Solutions*

Cypress-Fairbanks Independent School District, just north of Houston, is Texas' third largest district with an enrollment of 97,000 students. The district maintains nine high schools, each with at least 3,000 students. Total high school enrollment is approximately 30,000 students. In addition, there are four "special program facilities" (an adaptive behavior center, an alternative learning center, the Carlton Vocational Center, and Windfern High School). Cy-Fair offers a comprehensive K-12 program for all students who are classified as "at risk."

PLATO Learning provided Cy-Fair with a two-part credit recovery, secondary-intervention model, with school labs and an off-campus center. While Cy-Fair did not have a prior need for a dropout prevention program due to its graduation rate success, the district recognized the need for an aggressive intervention program to address the needs of students who fall behind their classmates. The program was designed to provide preventive measures, beginning with the high school and expanding to the middle school for succeeding years. The district opted to channel funds from the Texas High School Allotment (HB 1) to support the program implementation.

Cy-Fair bussed a group of at-risk 9th-grade students from their regular schools to a central school site to receive total immersion. These students attended their traditional sophomore-level classes in addition to using *PLATO Online Secondary Solutions* for credit recovery. Another group of students made up of juniors and seniors used the courseware for credit recovery in their own schools. These students needed between one and four credits in order to continue or graduate.

Each Cy-Fair high school has a teacher who is responsible for the implementation of *PLATO Online Secondary Solutions* for credit recovery. The schools operate on a seven-period school day. Students can also access the courseware before school, after school, and from home at any time.

The table below contains demographic characteristics of the student sample for this study. In addition, 89 percent of the students were classified as being "at risk."

Table 1. Student sample demographics

Ethnicity	Percentage (n)
Hispanic	55% (847)
African American	26% (403)
White	16% (250)
Asian/Pacific Islander	3% (43)
American Indian	<1% (2)

The professional services model for Cy-Fair included an onsite training model at the inception of the implementation, followed by ongoing program evaluation and support. PLATO Learning assigned an education consultant to the implementation to ensure consistent support for program development and evaluation. Throughout the term of the study, the consultant provided on-site mentoring and support for each campus through quarterly visits. The consultant also joined the district's lab managers at after-school "share sessions" to exchange information.

Educators have long known that students differ in the amount of time they need to complete a task. The logistics of a conventional school make it hard to treat time as a variable. In a class with a large number of students, it's not feasible for a single teacher who is supported by only paper-and-pencil materials to give some students a lot of time and other students less time, based on their needs. One of the benefits of online learning is that the computer can accommodate students' differing time budgets. For the Cy-Fair installation, this analysis examined the mean number of hours that students spent using *PLATO Online Secondary Solutions* for each curriculum topic. Students spent the most time on remediation in World Geography and U.S. History. These subjects are also two of the three areas in which students demonstrated the greatest increase in assessment scores (pre- to post-, see section 4.3 below).

Table 2. Time on task and number of students, by curriculum topic
(Listed by most-to-least hours)

Curriculum topic	Mean time on task (hours)	Number of students
World Geography	41.0	101
US History	32.4	61
Algebra	32.0	239
Integrated Physics and Chemistry	28.4	190
Biology	26.9	123
World History	26.8	100
Geometry	23.1	163
English	18.0	477
Chemistry	16.4	16

4.0 Results from PLATO's Online Secondary Solutions

4.1 Effect of PLATO Online Secondary Solutions on course credit received

For this analysis, the district provided the teacher-assigned grades for the academic year 2007-08 and for the following year, 2008-09, when at-risk students began using *PLATO Online Secondary Solutions*. Students who did not earn a passing score (at least 70 percent) by the end of 2008 used *PLATO Online Secondary Solutions* to work towards course credit in the following year. The table below shows the percentage of students, for each curriculum content area, who failed course in 2007-08 and then successfully completed the same course using *PLATO Online Secondary Solutions* in 2008-09. These results demonstrate the effect of PLATO courseware on the academic achievement of students who were failing courses in 2007-08 and at-risk of not graduating high school.

Table 3. Percentage of students who repeated a course using PLATO and received teacher-assigned passing grades (≥70%)

(By subject, listed by most-to-least)

World Geography	95.6 (43)
Integrated Physics and Chemistry	85.3 (81)
World History	80.4 (41)
Geometry	80.0 (84)
Algebra	76.9 (84)
US History	76.7 (32)
English	75.3 (253)
Chemistry	66.7 (9)
Biology	56.9 (37)

Overall, of the Cy-Fair students who failed a course in 2008, then re-took the same course in 2009 using *PLATO Online Secondary Solutions*, 84 percent completed and passed the course the second time.

4.2 Significant increases in course grades for all subject areas

Student performance for the two academic years was compared in the subjects that students repeated. In all subject areas, students earned significantly higher course grades when using *PLATO Online Secondary Solutions* than they did in the previous academic year. These differences also yielded strong effect sizes.

Academic topics that are often obstacles to high school graduation—Algebra and English, for example—consistently had strong gains. And those gains came from **students who had not previously done well in those respective courses**. On average, students who used *PLATO Online Secondary Solutions* to retake courses they had failed earned final course grades that were nearly 17 points higher. The results are presented below in tables, and then again as histograms, in Figures 1 and 2.

Table 4. Improvements in student performance from 2007-08 to 2008-09: fall semester

(Listed by most-to-least gains in teacher-assigned grades)

Subject area	Course Grade		Average Gain	Significance (p-value)	Effect Size	n
	07-08	08-09				
World History	56.6	76.7	**20.1**	<.001	2.6	24
Algebra (I and II)	57.2	75.8	**18.6**	<.001	2.0	68
English (I, II, III and IV)	55.8	74.1	**18.3**	<.001	2.2	112
World Geography	57.0	74.8	**17.8**	<.001	3.0	22
Chemistry	56.0	73.7	**17.7**	<.05	6.1	3
Integrated Physics and Chemistry	57.5	72.7	**15.2**	<.001	2.0	65
Geometry	58.1	72.4	**14.3**	<.001	1.7	44
U.S. History	58.7	72.9	**14.2**	<.001	2.7	10
Biology	59.4	72.0	**12.6**	<.001	1.6	17
Average score gain			**17.0**			

Table 5. Improvements in student performance from 2007-08 to 2008-09: spring semester

(Listed by most-to-least gains in teacher-assigned grades)

Subject area	Course Grade		Average Gain	Significance (p-value)	Effect Size	n
	07-08	08-09				
World History	51.6	77.3	**25.7**	<.01	1.9	22
Algebra (I and II)	52.3	71.5	**19.2**	<.001	1.4	68
English (I, II, III and IV)	53.7	72.1	**18.4**	<.001	1.9	112
Chemistry	55.7	73.7	**18.0**	<.05	2.8	3
World History	55.0	70.7	**15.7**	<.001	1.4	24
U.S. History	59.7	73.7	**14.0**	<.01	1.1	10
Integrated Physics and Chemistry	57.9	71.3	**13.4**	<.001	1.3	65
Geometry	56.7	69.7	**13.0**	<.001	1.2	44
Biology	57.9	69.2	**11.3**	<.001	1.3	20
Average score gain			**16.8**			

Description of data elements in Tables 4 and 5

Subject area: Cy-Fair courses that students in the study sample retook for credit recovery using PLATO Online Secondary Solutions

Course grade: Average teacher-assigned final course grades; in 2007–08, students received traditional classroom instruction, while in 2008–09, students retook the same course using *PLATO Online Secondary Solutions*.

Average gain: The average score gain for all students who retook the specific course across the two academic years

Significance: The statistical significance of a result is the probability that the observed difference in a sample is representative of a difference that actually exists. P-values <.05 are judged to be statisticallysignificant. P-values range from 0 to 1.

Effect size: Effect size measurements describe the relative magnitude, or impact, of the program treatment. They indicate whether statistical significance can be interpreted as practical and meaningful.

n: The applicable sample size

Figure 1. Course grade gains from 2007–08 to 2008–09 for all content areas

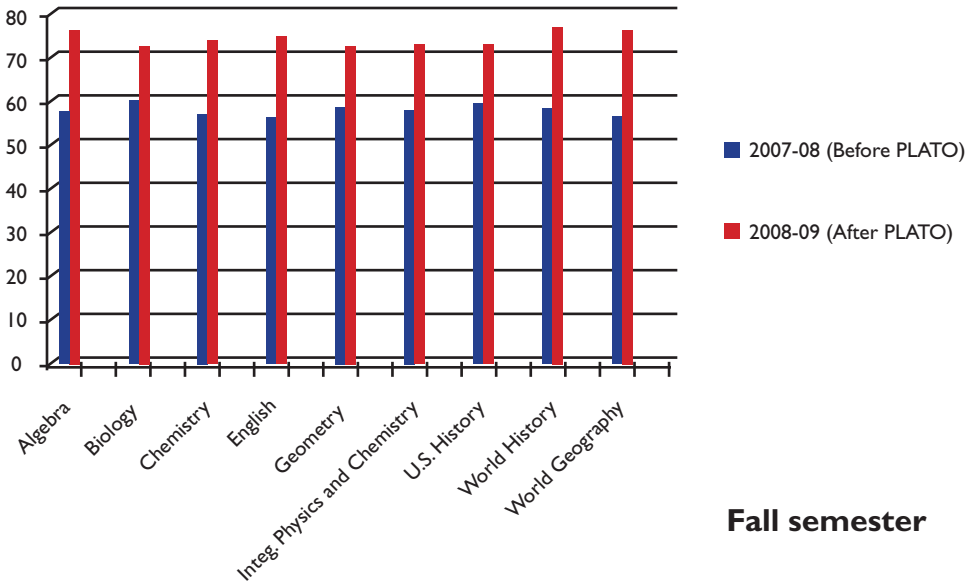
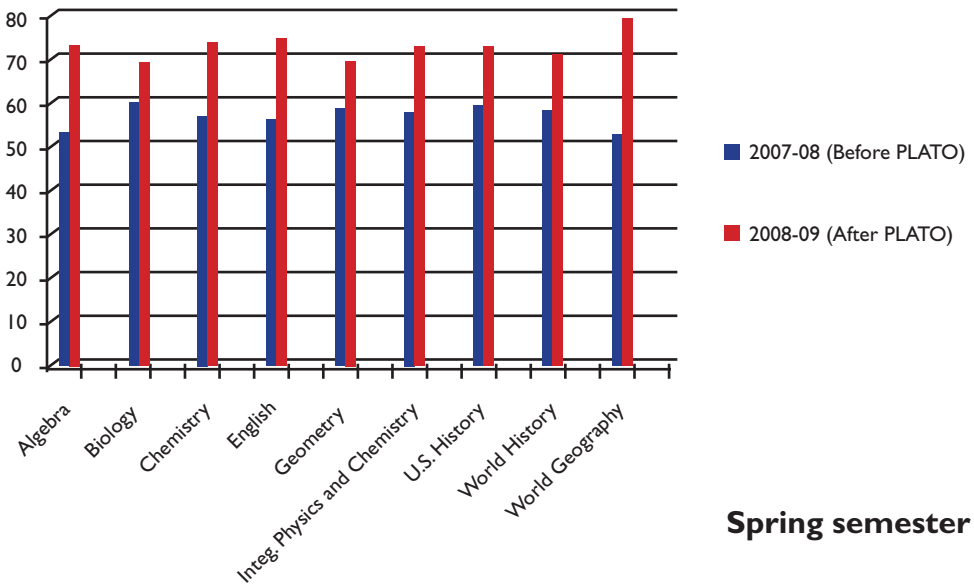


Figure 2. Course grade gains from 2007–08 to 2008–09 for all content areas



4.3 Significant increases in posttest assessment scores compared to pretest assessment scores for all subject areas

PLATO Learning's computer-related assets support finely grained testing to determine what a student knows and needs to know (the pretest) and then what they have learned (the posttest). The following tables show consistent, statistically significant improvements associated with using *PLATO Online Secondary Solutions*. The low beginning scores are characteristic of a population that needs additional remediation to be successful. These scores also show the challenge before teachers who are implementing *PLATO Online Secondary Solutions*.

For each of the nine core-curriculum subject areas, students scored significantly higher on the post-course assessment when compared to the pre-course assessment. Within a particular subject area, PLATO Learning assessments are parallel in content but different in form. Therefore, the gains are not due to practice effects or to students "gaming the test" (learning the answers).

Note: For each subject area, Cy-Fair teachers using *PLATO Online Secondary Solutions* administered several pre-and post-course assessments, with each set covering a specific portion of course content. The number of pre- and post-course assessment pairs varies by subject.

Table 6. Student gains on PLATO Learning pre- and post-course assessments by curriculum topic: 2009
(Listed by most-to-least average gain)

Subject area	Pretest	Posttest	Gain	Significance	n
World History	40.7	69.8	**29.1**	<.001	75
	34.0	72.1	**38.1**	<.001	69
	36.6	72.2	**42.7**	<.001	66
	36.6	72.2	**35.6**	<.001	67
					Average gain: 36.4
U.S. History	37.6	69.4	**31.9**	<.001	50
	43.6	72.7	**29.1**	<.001	43
	38.3	67.5	**29.2**	<.001	42
	36.6	71.0	**34.4**	<.001	35
					Average gain: 31.2
World Geography	38.3	72.6	**34.3**	<.001	43
	43.0	67.4	**24.5**	<.001	40
	45.2	64.8	**19.6**	<.001	32
					Average gain: 26.1
Integrated Physics and Chemistry	48.0	67.6	**19.6**	<.001	140
	44.9	67.7	**22.8**	<.001	125
					Average gain: 21.2
Algebra (I and II)	67.5	80.9	**13.4**	<.001	182
	43.4	64.3	**20.8**	<.001	138
	48.7	65.7	**16.9**	<.001	129
	47.9	72.2	**24.2**	<.001	80
					Average gain: 18.8
Biology	51.5	63.2	**11.6**	<.001	100
	47.8	62.8	**15.0**	<.001	85
	44.5	62.3	**17.3**	<.001	71
	41.4	57.4	**15.9**	<.001	52
					Average gain: 15.0
Chemistry	56.7	73.8	**17.1**	.05	12
					Average gain: 12.0
English (I, II, III and IV)	57.3	63.1	**5.8**	<.001	412
	48.5	64.9	**16.4**	<.001	386
	54.2	62.6	**8.3**	<.001	373
	46.3	65.7	**19.4**	<.001	234
	40.1	62.8	**22.7**	<.001	123
					Average gain: 14.5
Geometry	57.6	63.5	**5.8**	.01	136
	50.5	67.7	**17.2**	<.001	109
					Average gain: 11.5

Figure 3. Student progress in World History

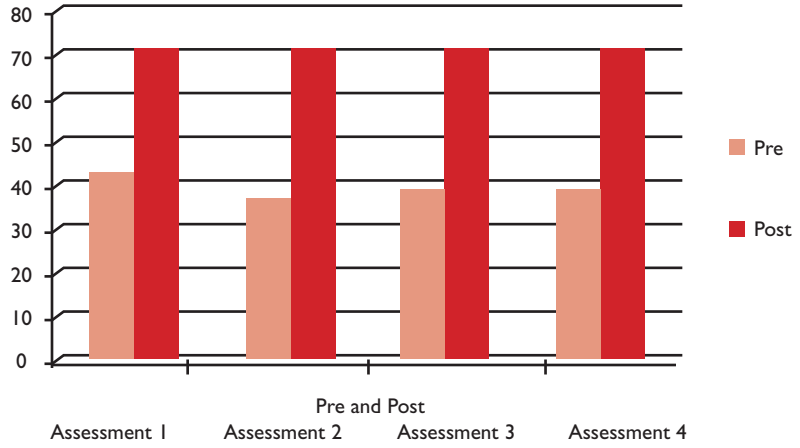


Figure 4. Student progress in U.S. History

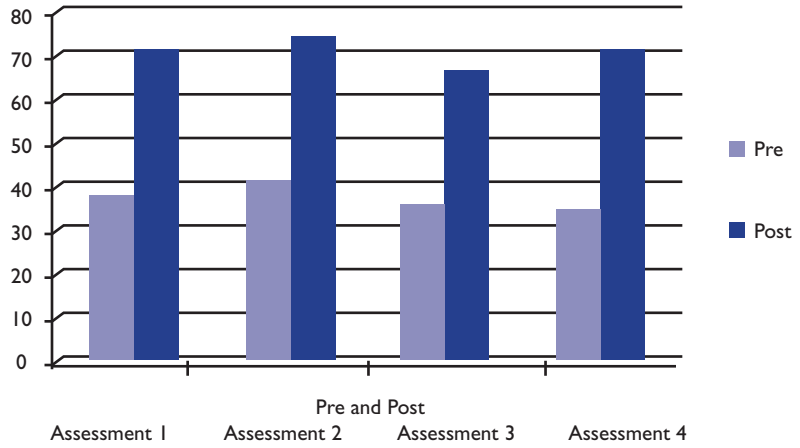


Figure 5. Student progress in World Geography

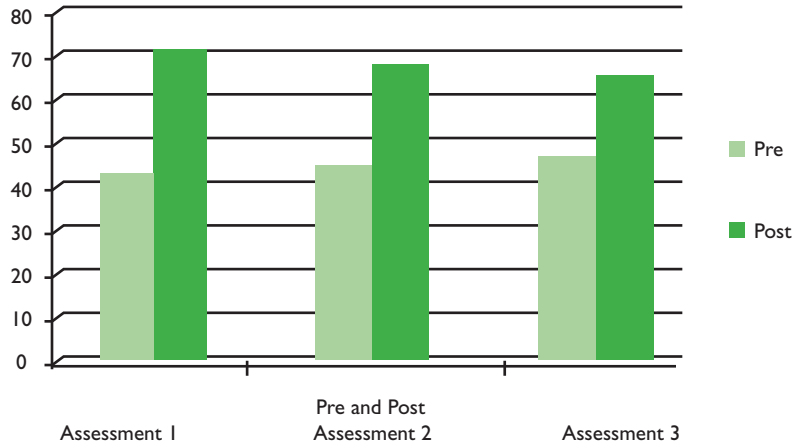


Figure 6. Student progress in Integrated Physics and Chemistry

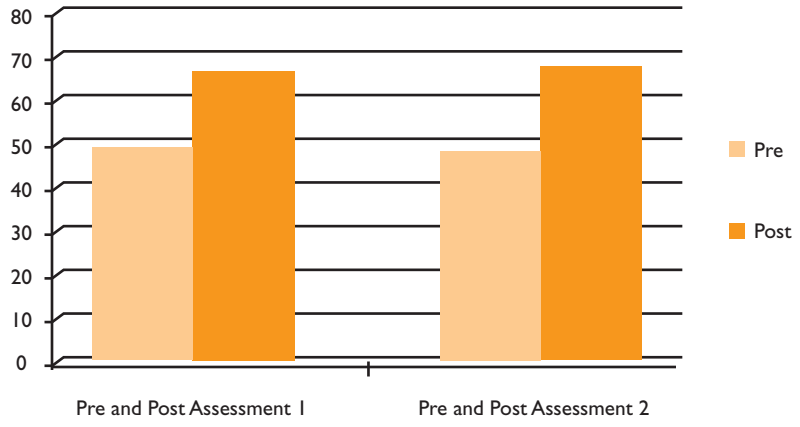


Figure 7. Student progress in U.S. History

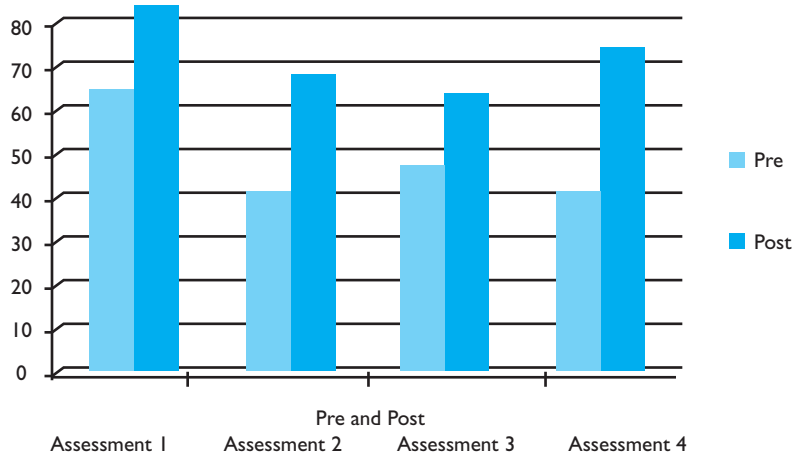


Figure 8. Student progress in Biology

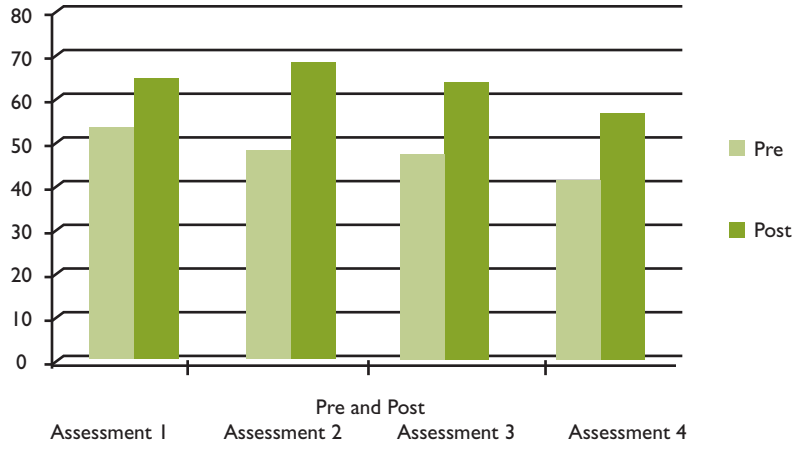


Figure 9. Student progress in Chemistry

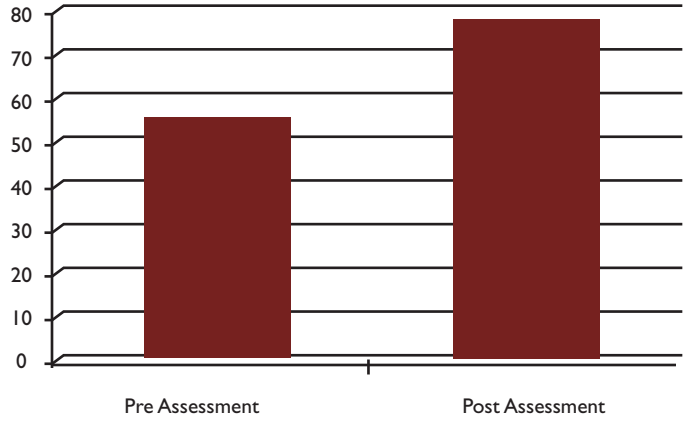


Figure 10. Student progress in English

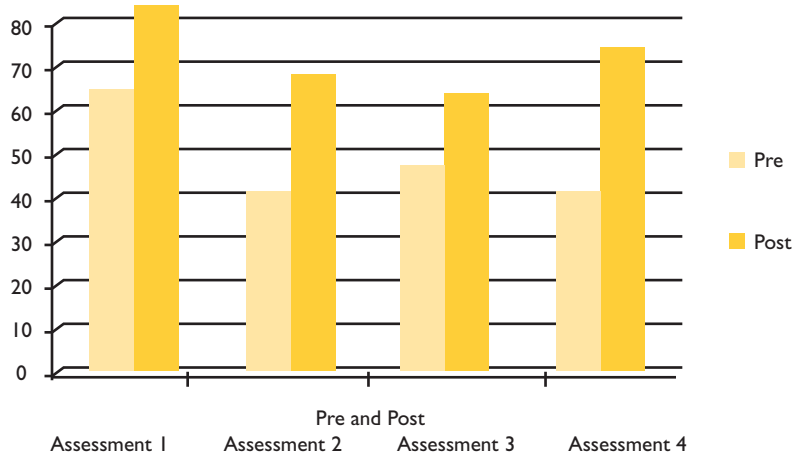
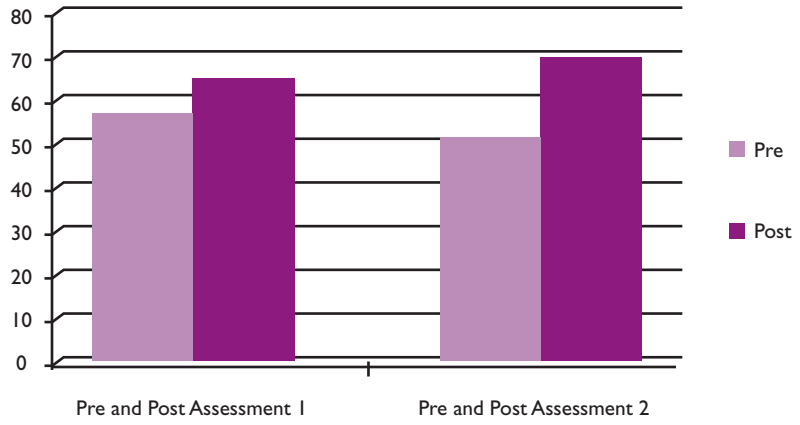


Figure 11. Student progress in Geometry



4.4 Higher levels of improvement in course grades for Limited English Proficient (LEP) students

Students who have limited English skills are a particular challenge to U.S. schools. When Cy-Fair teachers used *PLATO Online Secondary Solutions* to help LEP students, those students had even stronger performance gains than other *PLATO Online Secondary Solutions* students over the two academic years examined in this analysis (as indicated by teacher-assigned grades).

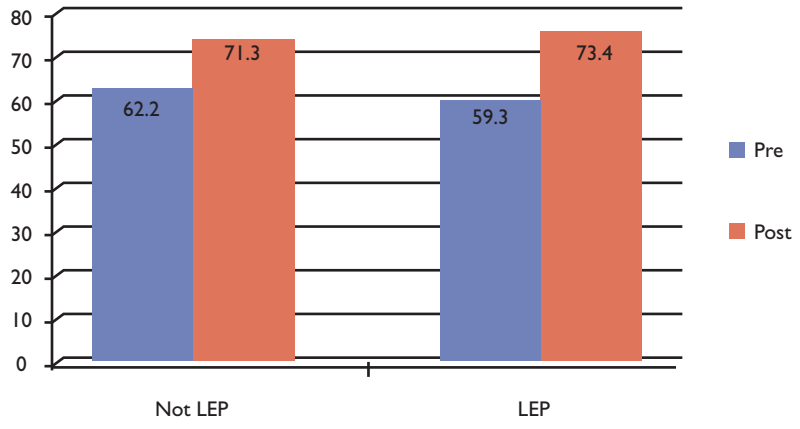
Table 7. Student improvement in course grades: fall semester

	Not LEP	LEP
2007-08	62.2	59.3
2008-09	71.3	73.4
Gain	**9.1**	**14.1**

Table 7. Student improvement in course grades: spring semester

	Not LEP	LEP
2007-08	57.3	55.5
2008-09	71.3	70.9
Gain	**14.6**	**15.4**

Figure 12.



When teacher-assigned course grades from 2007–08 were compared to those from 2008–09, LEP students showed higher gains than other students in course grades for both semesters. The LEP students began with lower scores in 2008, but ended up with higher scores in 2009, when compared to non-LEP students.

4.5 Levels of improvement by ethnicity, gender, and at-risk classification

To explore the relationship between student background characteristics and how PLATO Online Secondary Solutions contributed to school performance, this analysis examined aggregate performance across all content areas for each of the common student descriptive groups between 2007–08 and 2008–09. For this analysis, the "all-topics" combination includes English, Algebra, Geometry, Biology, Chemistry, Integrated Physics and Chemistry, U.S. History, World Geography, and World History. The gains below represent the average of any combination of those courses completed for any individual in the descriptive group (combining the topics preserves cell sizes). Note that the students whose performance is reported in 2007–08 are the same students whose improved performance is reported for the next year (these students had repeated the course using *PLATO Online Secondary Solutions* because their prior year's work was not satisfactory).

All groups improved their average performance across academic years. The similarity of the gains across the groups suggests that PLATO Online Secondary Solutions is able to equally help all students learn across both semesters of the academic year.

Table 9. Improvements in student performance from 2007–08 to 2008–09: by subgroup, fall semester

Subgroup	Course Grade		Average Gain	Signifigance (p-value)	Effect Size	n
	07-08	08-09				
At-risk classification						
Not at-risk	60.2	77.8	17.6	<.001	2.7	16
At-risk	56.9	73.9	17.0	<.001	2.1	349
Ethnicity						
Asian/Pacific Islander	55.2	77.4	22.2	<.001	2.6	13
Hispanic	56.7	74.1	17.5	<.001	2.2	218
Caucasian	55.8	72.6	16.8	<.001	1.6	42
African American	58.9	74.3	15.4	<.001	2.1	92
Gender						
Female	57.3	74.6	17.2	<.001	2.1	153
Male	56.8	73.7	16.9	<.001	2.1	212

Table 10. Improvements in student performance from 2007–08 to 2008–09: by subgroup, spring semester

Subgroup	07-08	08-09	Average Gain	Significance (p-value)	Effect Size	n
At-risk classification						
Not at-risk	50.3	74.9	**24.6**	<.001	1.8	27
At-risk	55.2	71.3	**16.0**	<.001	1.5	390
Ethnicity						
Asian/Pacific Islander	52.1	73.1	**22.2**	<.001	2.2	12
Hispanic	54.1	71.1	**17.0**	<.001	1.5	244
Caucasian	55.6	72.2	**16.6**	<.001	1.5	72
African American	56.9	71.8	**14.9**	<.001	1.6	89
Gender						
Female	55.6	73.0	**17.0**	<.001	1.6	163
Male	54.5	71.0	**16.3**	<.001	1.5	254

5.0 Evaluation of PLATO Learning by Cy-Fair graduates who used *PLATO Online Secondary Solutions*

To measure the attitudes and opinions of students who used *PLATO Online Secondary Solutions* to help them graduate in 2009, a Web-based survey was developed. Approximately 5,000 individuals identified by Cy-Fair as 2009 graduates were invited to participate. Responses were received from 852 graduates (17 percent).

Of the 852 respondents, 55 (7 percent) replied that they used *PLATO Online Secondary Solutions* in high school. Of those graduates,

- 55 percent used the courseware as part of a class;
- 20 percent used the courseware for extra credit; and
- 26 percent used the courseware to recover high school credits and meet graduation requirements.

Cy-Fair graduates who used *PLATO Online Secondary Solutions* in high school had positive opinions about the usefulness of the program, with 90 percent agreeing that the program was “very helpful” or “helpful” to them.

Table 11. Purpose of *PLATO Online Secondary Solutions*

Response	Number of respondents	Percentage
As part of a class	30	55%
For extra credit	11	20%
To recover credits	14	25%

Table 12. Graduate evaluations of *PLATO Online Secondary Solutions*

Response	Number of respondents	Percentage
Very helpful	24	44%
Helpful	25	46%
Not Helpful	6	10%

Forty-seven of the 55 graduate respondents (86 percent) said "Yes" when asked "Did you enjoy using PLATO in high school?" When asked if they thought PLATO helped them graduate, 34 of the 55 respondents (62 percent) said "Yes."

Graduate opinions of *PLATO Online Secondary Solutions*

- "Without PLATO, I think I would never have graduated. PLATO helped me so much in recovering my credits. I really recommend PLATO for those who are struggling."
- "I learned a lot using it, and I also enjoyed it."
- "I liked doing my work online."
- "It got me caught up in class and I could go at my own pace which was really helpful."
- "It helped me a lot to be able to graduate on time, with my class."
- "I would not have been able to graduate without the opportunity to use PLATO."
- "PLATO helped and gave me a good experience. Everything I learned in high school helps me today in the real world."
- "PLATO was an outstanding opportunity…it made it easier to learn the material."

6.0 Post-secondary college and employment experiences of Cy-Fair graduates who used *PLATO Online Secondary Solutions*

Seventy-five percent (41 out of 55) of the graduate respondents who had used *PLATO Online Secondary Solutions* in high school enrolled in college-level courses. Twenty percent of those graduates are employed full-time, and 26 percent are employed part-time. Seventy-seven percent of the graduates who are unemployed are currently enrolled in college courses

Of the Cy-Fair graduates who used *PLATO Online Secondary Solutions* and are now enrolled in college courses, 40 percent attend a four-year university, 27 percent attend a community college, and 9 percent take courses at a vocational/trade school.

These responses demonstrate that a majority of the Cy-Fair graduates who were not previously successful academically and used *PLATO Online Secondary Solutions* in high school to recover credits went on to pursue a college degree after graduation.

7.0 Teachers' evaluations of *PLATO Online Secondary Solutions*

Teachers who used *PLATO Online Secondary Solutions* to help their students recover high school credits during the 2008–09 academic year also received the survey. Twelve teachers responded. Their opinions were positive and reflect the beliefs of Cy-Fair teachers about the significant contribution that *PLATO Online Secondary Solutions* makes to the academic achievement of at-risk students.

Teachers' perceptions about their use of *PLATO Online Secondary Solutions*

- 100 percent agreed that the courseware was more successful than the materials students had previously been using.
- 89 percent agreed that the courseware is aligned to Texas standards and that PLATO Online Secondary Solutions saved them time.
- 83 percent agreed that the courseware is easy to use.
- 82 percent reported that PLATO helped them sort and group students.
- 82 percent reported that PLATO helped them coordinate with other teachers.
- 75 percent reported that PLATO made teaching easier for them.
- 75 percent agreed that the professional development they received made it easy to use PLATO Online Secondary Solutions.
- 70 percent replied that PLATO is a step up from how they used to teach.
- 64 percent reported that PLATO increased the effectiveness of the classroom.

Teachers' perceptions about their students' use of *PLATO Online Secondary Solutions*

The teachers agreed unanimously that their students were more successful using *PLATO Online Secondary Solutions* than in their previous years of schooling. The teachers also noted that students preferred PLATO Learning's online courses to paper-and-pencil materials. In addition,

- 92 percent agreed that students found the courseware easy to use;
- 83 percent agreed that students felt the courseware would give them academic and analytical skills that would be helpful later; and
- 73 percent agreed that students thought the courseware would give them job-related skills that would help them later.

Teacher opinions of *PLATO Online Secondary Solutions*

- "I think it is a fantastic program. The administration at Cypress Ridge supports it 100 percent and that is what also made it so successful…I feel it is a last chance for many students that would have dropped out of school."

- "Since we use PLATO as a recovery tool, our main goal was to get students to "buy back" into school. In this way, I felt the program was very successful. Most of the students I deal with have problems dealing with paper/pencil tasks and the online program worked well for them…this program gives hope to many students who do not see the light at the end of the tunnel."

8.0 Summary of results

Online learning can be used to address and capitalize on a student's individual learning style. Online learning also makes it possible to differentiate learning more effectively based on continuous assessment and adjustment to individual student needs. These results demonstrate that students' mastery of course content improved significantly and meaningfully after using *PLATO Online Secondary Solutions* as demonstrated by performance gains in teacher-assigned course grades and PLATO Learning assessment scores. Cy-Fair's most challenged learners, those who had not passed courses in the traditional classroom, received significantly higher course grades when using *PLATO Online Secondary Solutions* compared to the previous academic year, when they were not using the courseware. Students experienced differing sequences of content, depending on their school, teacher, and individual achievement. PLATO Learning's innovative, rigorous, and engaging curriculum gave students a needed alternative and second chance to learn.

The similarity of grade gains across all groups suggests that *PLATO Online Secondary* Solutions is able to equally help all students learn across both semesters of the academic year. These results demonstrate that PLATO Learning offers program flexibility that can accommodate a group of students with varying learning trajectories. The results also demonstrate that a majority of the student respondents who were not previously successful academically and used *PLATO Secondary Solution* in high school to recover credits go on to pursue a college degree after graduation.

9.0 Methods

The Cy-Fair Independent School District data were transformed to protect the anonymity of student data. Descriptive and inferential statistics were used in the analysis and interpretation of the data. Cypress-Fairbanks and PLATO Learning data were disaggregated by subject area prior to statistical analysis.

PLATO Online Secondary Solutions was first implemented during the 2008–09 academic year. Student data included teacher-assigned course grades for each semester of two academic years (2007–08 and 2008–09) and PLATO Learning assessment scores for 2008–09. Thus, the significance of differences in teacher-assigned grades was tested for both years, by semester, using paired sample t-tests with an alpha of .05. Paired sample t-tests were also used to compare PLATO Learning pre-course and post-course assessments for each subject area. Cohen's *d* was used as a measure of effect size. Descriptive statistics were used to summarize Web-based survey data collected from Cy-Fair graduates and teachers.

10.0 Acknowledgements

We are grateful to the Cypress-Fairbanks Independent School District for its cooperation with this analysis. The district commented on our methods and made data available, and for that insight and assistance, we are appreciative. Interactive, Inc., is solely responsible for the results of this analysis.

11.0 About Interactive, Inc.

Interactive, Inc. is listed on the U.S. Department of Education's Institute of Education Science "gold standard" Registry of Outcome Evaluators and was one of the Department's contractors for a longitudinal, statewide documentation of the effects of technology on student achievement and school improvement.

Dr. Dale Mann has chaired PLATO Learning's research advisory group and authored "Choosing and Using Educational Technology: Making Evidence-Based Decisions, a Guide for Educational Leaders," Educator Series Number 3, 2003.

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