Examining the Impact of ASSET Membership on Student Achievement

Analysis of PSSA Grades 4 and 8 Data

Eric R. Banilower
Aaron M. Weis

With Assistance From:
James S. McGinley
Daniel J. Simons

December 2009

Submitted to: ASSET, Inc.
2403 Sidney Street, Suite 800
Pittsburgh, PA 15203

Submitted by: Horizon Research, Inc.
326 Cloister Court
Chapel Hill, NC 27514-2296

Introduction

Achieving Student Success through Excellence in Teaching (ASSET), a non-profit organization, has the goal of improving elementary science education. ASSET began its work in 1994 with two school districts. Sixteen partner districts were added in 1995 with the support of a multi-million dollar National Science Foundation (NSF) Local Systemic Change through Teacher Enhancement grant, and 14 more districts joined ASSET in 1998. When the NSF grant ended in 2001, ASSET transitioned to a fee-for-service model, and by 2004 had 45 member districts, charter schools, and private schools, predominantly in southwest Pennsylvania.

Membership in ASSET provides teachers access to FOSS and STC science modules for classroom use. The modules emphasize scientific inquiry, including having students spend a substantial amount of time conducting investigations, collecting and analyzing data, and drawing conclusions. ASSET membership also gives schools access to a wide array of professional development, including workshops addressing the modules, inquiry more generally, and writing to learn/science notebooking.

Although ASSET aims for a number of different teacher and student impacts (e.g., enthusiasm for and interest in science), the purpose of this study was to examine the impact of ASSET membership on student science achievement as measured by the Pennsylvania System of School Assessment (PSSA). The study also investigated the relationship between student achievement and the extent of school participation in ASSET, based on the number of years in the program, the number of modules ordered, and days of professional development attended.

Scores from the 4th grade PSSA, the only elementary grade in which the statewide science assessment is administered, were the primary data used in this study. Because ASSET members can also participate at 5th and 6th grade, and more recently at the middle school level, the study examined 8th grade PSSA scores as well.

This study sought to answer the following questions:

1. Did students in ASSET member schools score higher on the 2008 and 2009 PSSA science, reading, and mathematics assessments than students in matched comparison schools that are not ASSET members?

2. Is participation in ASSET related to differences in any existing achievement gaps?

3. Are there differences in performance by year (i.e., are the trajectories of scores across years for ASSET member and comparison schools diverging, converging, or parallel)?

4. What is the relationship between PSSA scores and the extent of ASSET member school participation in the program?

Identifying Comparison Schools

ASSET provided HRI with a list of ASSET member schools that contained 4th and/or 8th grade. Because schools were not randomly selected to participate in ASSET it cannot be assumed that they are typical of all schools in the state. Consequently, contrasting ASSET member schools' PSSA results to the state average may not result in a fair comparison.

In order to identify a set of schools comparable to those that decided to join ASSET, HRI used a process called propensity score matching (Rosenbaum & Rubin, 1983; Rubin, 2001). Propensity score matching is a statistical technique that uses what is known about the schools (e.g., student and school demographics, historical achievement) to determine which characteristics appear to predict participation in a treatment (in this case ASSET membership). The process then identifies schools that are similar to the treatment schools on those characteristics.

Two sets of matches were generated, one for ASSET member schools that contained 4th grade and a second for ASSET member schools that contained 8th grade. HRI included the following factors in the propensity score matching process:

- Percent of students in each race/ethnicity group;
- Percent of students of each gender;
- Percent of students classified as economically disadvantaged;
- Percent of students classified as English language learners;
- Percent of students with an individualized education plan (IEP);
- Percent of students classified at Title 1;
- Whether the school is classified as a charter school;
- Number of students in the school who took the PSSA as a measure of school size; and
- Community type (city, suburb, town, rural).

HRI limited the pool of potential comparison schools to public schools. Schools participating in Science: It's Elementary (a program run by ASSET that provides similar services) and those in districts that had been, but were no longer, members of ASSET were excluded from the matching pool. After an initial list of comparison schools was identified, schools were contacted to determine the nature of their science program. Schools that used science modules like those provided by ASSET were excluded from the comparison group and another school was selected.

It is important to note that the matching algorithm assumes all important data about the schools is known. The data used for the matching were those available in the PSSA data file. However, information about the comparison schools' participation in professional development or other school-improvement initiatives was not available and gathering such information was beyond the scope of this study. Thus, these analyses should be seen as exploratory in nature, providing initial but not conclusive evidence.

Tables 1–3 show the characteristics of the 104 schools in ASSET member districts containing 4th grade that were represented in the PSSA data file (a small number of member schools, typically private schools, were not included in the file) and their matched comparison schools, as well as

all schools in the state that contained 4th grade.[1] ASSET member schools were more likely to be located in the suburbs and less likely to be classified as a Title 1 school than a typical school in the state. ASSET member schools also contained a greater proportion of white students, and a smaller proportion of economically disadvantaged students, than the typical school. In contrast, the schools selected as matched comparisons are quite similar to ASSET member schools.

Table 1
Demographic Characteristics for Schools Containing 4th Grade

	Percent of Schools		
	Statewide (N = 1,750)	**ASSET Treatment Schools (N = 104)**	**Matched Comparison Schools (N= 104)**
Charter School	4	1	1
Community Type			
City	22	6	4
Suburb	41	73	74
Rural	12	9	9
Town	25	13	13

Table 2
Number of 4th Grade Students in the School

	N	Minimum	Maximum	Mean	Standard Deviation
Statewide	1,750	1.00	446.00	73.28	44.85
ASSET Schools	104	15.00	378.00	77.30	61.09
Matched Comparison Group	104	9.00	340.00	80.89	53.37

Table 3
Demographic Characteristics for 4th Grade Students

	Percent of Students		
	Statewide (N = 126,883)	**ASSET Treatment Schools (N = 8,039)**	**Matched Comparison Schools (N = 8,417)**
Race/Ethnicity			
African American	15	15	12
Hispanic	8	1	1
White	73	81	83
Other	4	5	5
Gender			
Female	49	49	48
Male	51	51	52
Economically Disadvantaged	40	31	29
English Language Learner	3	1	1
Individualized Education Plan	16	17	16
Title 1	30	36	37

[1] Demographic characteristics of schools used in this study, and statewide, were nearly identical across the two years examined in this study. Demographic data presented in this report are based on the 2008-09 school year.

Tables 4–6 show the characteristics of the 17 ASSET member schools containing 8th grade and their matched comparison schools, as well as all 884 schools statewide with 8th graders.[2] As with the 4th grade data, ASSET member schools are much more similar to the matched comparison group than to schools statewide.

Table 4
Demographic Characteristics for Schools Containing 8th Grade

	Percent of Schools		
	Statewide (N = 883)	**ASSET Member Schools (N = 17)**	**Matched Comparison Schools (N= 17)**
Charter School	9	0	12
Community Type			
City	30	6	12
Suburb	34	76	76
Town	13	6	6
Rural	24	12	6

Table 5
Number of 8th Grade Students in the School

	N	Minimum	Maximum	Mean	Standard Deviation
Statewide	883	1.00	674.00	152.33	115.89
ASSET Member Schools	17	38.00	640.00	186.65	164.42
Matched Comparison Group	17	6.00	408.00	175.12	105.76

[2] It is important to note that because of the small number of ASSET member schools containing grade 8, the statistical power of the 8th grade analyses is very low (i.e., the probability of detecting a difference if one truly exists is small).

Table 6
Demographic Characteristics for 8th Grade Students

	Percent of Students		
	Statewide (N = 133,487)	**ASSET Member Schools (N = 3,173)**	**Matched Comparison Schools (N = 3,166)**
Race/Ethnicity			
African American	15	22	23
Hispanic	7	1	1
White	75	74	74
Other	4	4	3
Gender			
Female	49	48	48
Male	51	52	52
Economically Disadvantaged	36	34	36
English Language Learner	2	1	1
Individualized Education Plan	15	16	15
Title 1	17	5	8

Analysis and Results

The main outcome of interest in this study was science achievement as measured by the 2007–08 and 2008–09 PSSA 4th and 8th grade science assessment scale scores. HRI also examined student performance on two sub-scales, one comprised of nature of science items and the other of disciplinary content items (e.g., biology, physics).[3] In addition, HRI examined student performance on the PSSA reading and mathematics scale scores as ASSET emphasizes connecting science to literacy and mathematics, and believes that teaching practices that are effective for science translate into improved instruction in other content areas. Tables 7–10 show descriptive statistics for the outcome variables examined in this study for all students in the state and for those included in this study.

[3] Both the nature of science and the disciplinary science scores have very different ranges than the overall science scale score.

Table 7
2008 PSSA Grade 4 Scores

	Minimum	Maximum	Mean	Standard Deviation
Science Scale Score				
Statewide	1,050.00	2,256.00	1,429.11	174.13
ASSET Member Schools	1,050.00	2,256.00	1,453.80	168.63
Matched Comparison Schools	1,050.00	2,256.00	1,463.90	168.92
Nature of Science Score				
Statewide	1.00	33.00	23.14	6.02
ASSET Member Schools	3.00	33.00	24.13	5.75
Matched Comparison Schools	3.00	33.00	24.34	5.60
Disciplinary Science Content Score				
Statewide	1.00	33.00	22.63	5.54
ASSET Member Schools	3.00	33.00	23.27	5.24
Matched Comparison Schools	3.00	33.00	23.65	5.12
Reading Scale Score				
Statewide	700.00	2,318.00	1,365.04	225.49
ASSET Member Schools	700.00	2,318.00	1,404.43	220.33
Matched Comparison Schools	700.00	2,318.00	1,403.62	217.01
Mathematics Scale Score				
Statewide	700.00	2,370.00	1,442.84	243.57
ASSET Member Schools	772.00	2,370.00	1,476.41	232.48
Matched Comparison Schools	772.00	2,370.00	1,490.48	242.92

Table 8
2009 PSSA Grade 4 Scores

	Minimum	Maximum	Mean	Standard Deviation
Science Scale Score				
Statewide	1,050.00	2,271.00	1,450.07	175.60
ASSET Member Schools	1,050.00	2,271.00	1,472.51	170.78
Matched Comparison Schools	1,050.00	2,271.00	1,480.34	170.35
Nature of Science Score				
Statewide	1.00	34.00	23.78	6.02
ASSET Member Schools	3.00	34.00	24.59	5.80
Matched Comparison Schools	1.00	34.00	24.78	5.59
Disciplinary Science Content Score				
Statewide	1.00	34.00	23.52	5.97
ASSET Member Schools	2.00	34.00	24.25	5.60
Matched Comparison Schools	1.00	34.00	24.52	5.47
Reading Scale Score				
Statewide	700.00	2,299.00	1,377.48	221.94
ASSET Member Schools	700.00	2,299.00	1,406.37	217.02
Matched Comparison Schools	700.00	2,299.00	1,414.11	219.05
Mathematics Scale Score				
Statewide	700.00	2,405.00	1,458.73	233.14
ASSET Member Schools	790.00	2,405.00	1,483.04	224.36
Matched Comparison Schools	700.00	2,405.00	1,496.09	239.53

Table 9
2008 PSSA Grade 8 Scores

	Minimum	Maximum	Mean	Standard Deviation
Science Scale Score				
Statewide	700.00	2,062.00	1,285.01	173.60
ASSET Member Schools	925.00	1,924.00	1,279.23	177.43
Matched Comparison Schools	925.00	2,062.00	1,283.79	179.68
Nature of Science Score				
Statewide	1.00	33.00	19.62	6.18
ASSET Member Schools	1.00	33.00	19.41	6.31
Matched Comparison Schools	2.00	33.00	19.44	6.34
Disciplinary Science Content Score				
Statewide	1.00	33.00	18.67	6.02
ASSET Member Schools	1.00	33.00	18.47	6.18
Matched Comparison Schools	3.00	32.00	18.72	6.21
Reading Scale Score				
Statewide	700.00	2,628.00	1,477.47	273.53
ASSET Member Schools	700.00	2,628.00	1,472.49	272.01
Matched Comparison Schools	735.00	2,628.00	1,479.33	277.38
Mathematics Scale Score				
Statewide	700.00	2,270.00	1,403.92	221.54
ASSET Member Schools	814.00	2,270.00	1,393.46	221.15
Matched Comparison Schools	783.00	2,270.00	1,401.79	229.17

Table 10
2009 PSSA Grade 8 Scores

	Minimum	Maximum	Mean	Standard Deviation
Science Scale Score				
Statewide	925.00	2,303.00	1,305.22	196.76
ASSET Member Schools	925.00	2,067.00	1,299.96	195.58
Matched Comparison Schools	925.00	2,067.00	1,296.33	202.23
Nature of Science Score				
Statewide	1.00	34.00	20.82	6.60
ASSET Member Schools	2.00	34.00	20.63	6.67
Matched Comparison Schools	3.00	34.00	20.52	6.82
Disciplinary Science Content Score				
Statewide	0.00	34.00	20.34	6.83
ASSET Member Schools	3.00	33.00	20.21	6.78
Matched Comparison Schools	2.00	34.00	19.97	6.97
Reading Scale Score				
Statewide	700.00	2,621.00	1,505.61	260.13
ASSET Member Schools	700.00	2,621.00	1,508.73	266.29
Matched Comparison Schools	710.00	2,621.00	1,501.72	265.50
Mathematics Scale Score				
Statewide	722.00	2,286.00	1,424.89	218.24
ASSET Member Schools	860.00	2,286.00	1,409.19	214.03
Matched Comparison Schools	860.00	2,286.00	1,427.49	234.59

Although the propensity score matching process attempts to create groups that are equivalent, differences among the schools on important factors may still exist, so direct interpretation of outcomes can be misleading. Statistical techniques such as regression or analysis of variance can be used to control for differences in demographic characteristics among students and schools.

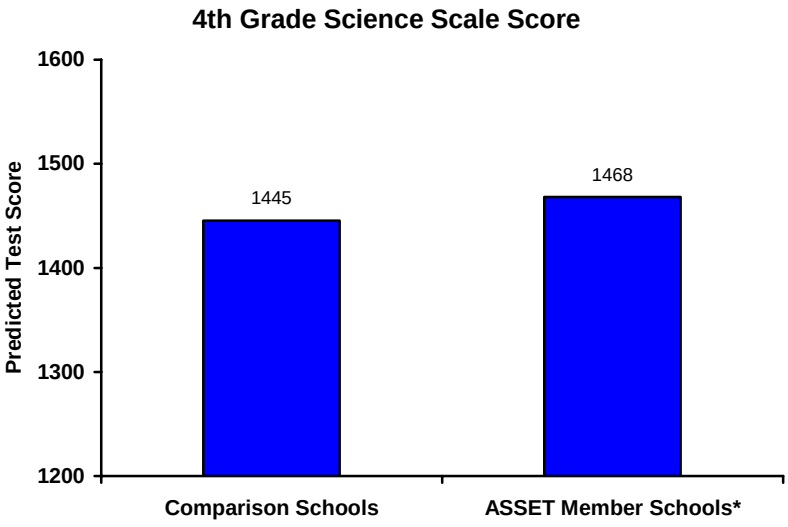
Further, students are nested within schools and statistical techniques that do not account for potential grouping effects (e.g., all students in a school having common experiences) can lead to incorrect estimates of the relationship between independent factors and an outcome. Hierarchical (multilevel) regression modeling (HLM) is an appropriate technique for nested data (Bryk & Raudenbush, 1992) and was used to examine student outcomes. Results for each set of analyses follow. Regression coefficients and standard errors are presented in the Appendix.

Science Assessment

HRI examined three outcomes from the PSSA science assessment: the overall scale score; the score on the nature of science items; and the score on the disciplinary content knowledge items. On the 4th grade PSSA, the analyses found that students in ASSET member schools scored significantly higher than students in the comparison schools on the science scale score and the nature of science score. Figures 1 and 2 show the predicted test score for a typical student in ASSET member and comparison schools.[4] The 23-point difference on the science scale score and the 1-point difference on the nature of science score are equivalent to effect sizes[5] of 0.13 standard deviations and 0.17 standard deviations, respectively. On the disciplinary science content score, students in ASSET member schools performed similarly to students in the comparison schools. These findings were consistent across the two years of data.

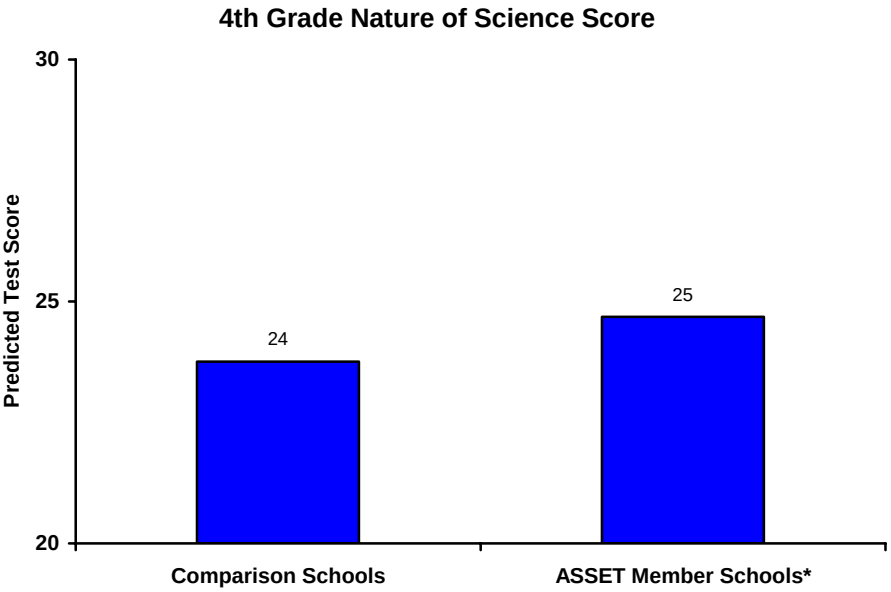
[4] The predicted test score results from the regression analysis; it accounts for differences among schools in their demographic composition. For example, two schools may be equally effective, but because one school has a higher proportion of low-SES students (and low-SES students tend to score lower on state tests than high-SES students), its scores may be lower on average than the other school. However, the predicted scores for the two schools would be the same, as the scores are adjusted for the differences in student demographics. Consequently, this adjusted score is a better measure of school effectiveness.

[5] When comparing two means, the effect size is calculated as the differences between the two means divided by the pooled standard deviation. Effect sizes of about 0.20 are typically considered small, 0.50 medium, and 0.80 large. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates.



* Controlling for student and school demographic characteristics, scores of students in ASSET member schools significantly different than students in comparison schools, $p < 0.05$ (HLM).

Figure 1



* Controlling for student and school demographic characteristics, scores of students in ASSET member schools significantly different than students in comparison schools, $p < 0.05$ (HLM).

Figure 2

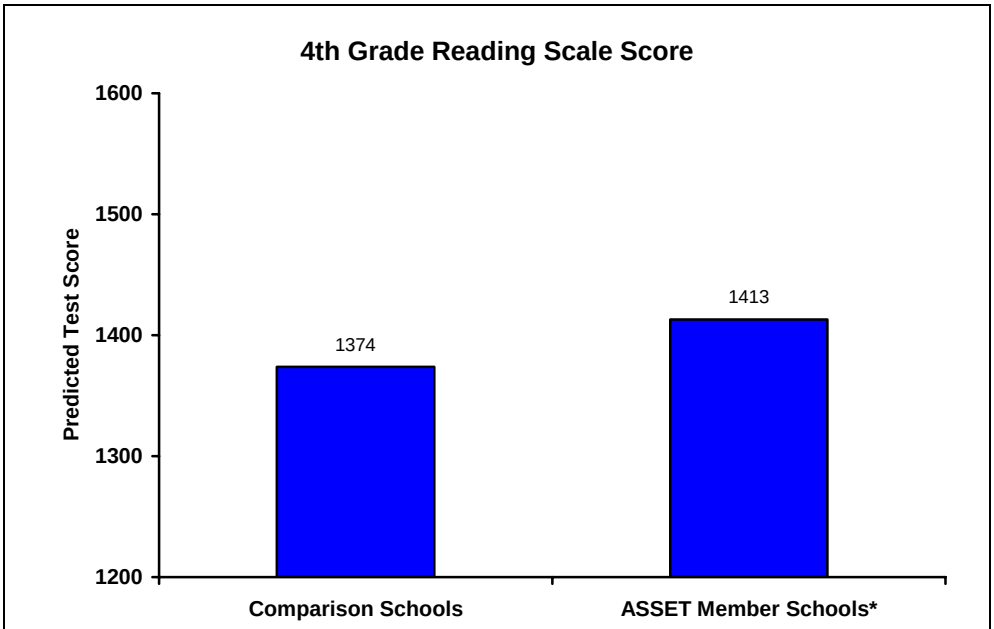
Overall, the number of years a school has been an ASSET member was not a strong predictor of 4th grade student scores, though there was some evidence that the differences in student scores were due in large part to schools that have joined ASSET in the past five years. These schools tended to score higher than their comparison schools, while schools that have been members longer tended to score about the same as their comparison schools.

On the 8th grade PSSA, students in member schools performed at the same level as students in comparison schools on both the science scale score and the nature of science score. On the disciplinary science score, 8th grade students in schools that have been ASSET members for 1–6 years scored slightly lower (less than 1 point, or 0.14 standard deviations) than students in their comparison schools. There was no difference in scores of students in schools that have been ASSET members for 11 or more years and students in their comparison schools.

At both grade levels there were a number of achievement gaps on each outcome: African-American/black students scored lower than white students; females scored lower than males; special education students scored lower than non-special education students; Title 1 students scored lower than non-Title 1 students; English-language learners (ELL) scored lower than non-ELL students; and students classified as economically disadvantaged scored lower than non-economically disadvantaged students. Although there were a few differences between ASSET member schools and comparison schools in these gaps across the various outcomes examined, there was no clear pattern in the findings; in some instances the gap was narrower in ASSET member schools and in other instances the gap was wider.

Reading Assessment

Results on the reading assessment were very similar to those found for the science outcomes. At 4th grade, students in ASSET member schools scored significantly higher than students in the comparison schools (see Figure 3). The 39-point difference translates to an effect size of 0.18 standard deviations. At 8th grade, students in schools that have been ASSET members for six or fewer years scored slightly lower than students in their comparison schools (a difference of about 18 points, or 0.07 standard deviations), while students in schools that have been ASSET members for more than six years had scores similar to students in their comparison schools.

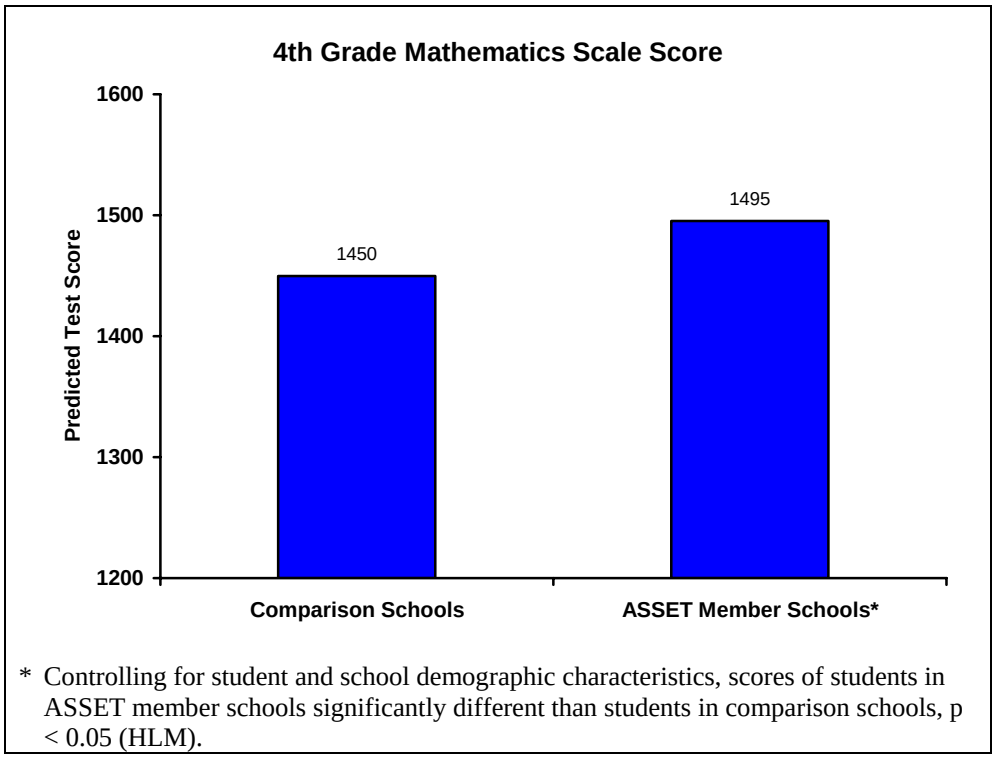


* Controlling for student and school demographic characteristics, scores of students in ASSET member schools significantly different than students in comparison schools, $p < 0.05$ (HLM).

Figure 3

Mathematics Assessment

As can be seen in Figure 4, students in ASSET member schools scored about 45 points higher than students in the comparison schools on the 4th grade mathematics assessment (an effect size of 0.19 standard deviations). There was no difference between ASSET member schools and their comparison schools on the 8th grade mathematics assessment. As with science and reading, similar differences among scores on the mathematics assessment existed for the various sub-groups of students, and there was no clear pattern of differences among the two groups of schools. There were no differences in these results across the two years of data.



* Controlling for student and school demographic characteristics, scores of students in ASSET member schools significantly different than students in comparison schools, $p < 0.05$ (HLM).

Figure 4

Extent of Participation

In addition to examining differences between ASSET member schools and a comparable set of schools not implementing a kit-based science program, HRI conducted a set of analyses examining the relationship between student PSSA scores and extent of school participation in the ASSET program. These analyses included the 88 elementary schools for which professional development attendance and module order records were readily accessible.[6] However, it is important to note that there are a number of limitations to these analyses. First, ASSET services are utilized by individual teachers, not entire schools. Because it is not possible to link individual student PSSA scores to specific teachers within a school, HRI had to aggregate the participation data to create a school-level measure of participation. Doing so reduces the sensitivity of the analyses, making it less likely that any effects of higher participation by individual teachers could be detected. In addition, HRI could not determine which of the teachers who had participated still teach at the member schools. Thus, schools that have had many teachers participate in ASSET professional development in previous years, but have experienced high levels of teacher turnover, would have a misleading measure of level of faculty involvement. For these reasons, these extent of participation analyses should be considered exploratory.

Table 11 shows the number of years ASSET member schools placed module orders and had teachers attending ASSET professional development.

[6] The small number of middle schools in the program precludes conducting similar analyses for the 8th grade PSSA data.

Table 11
Number of Years Schools Utilized ASSET Services

	Percent of Schools (N = 88)	
	Ordered Modules	**Teachers Attended Professional Development**
0 Years	2	0
1 Year	10	10
2 Years	5	5
3 Years	4	6
4 Years	11	8
5 Years	14	19
6 Years	42	40

HRI categorized schools into two levels of participation based on these data. As can be seen in Table 12, 53 percent of ASSET member schools ordered modules and participated in professional development in at least 5 of the last 6 years; these schools were categorized as "high use" schools. The remaining schools were categorized as "low use."

Table 12
School Participation in ASSET
(Percent of Member Schools Containing 4th Grade, N = 88)

		Years Ordering Modules	
		0–4	**5–6**
Years Attending ASSET Professional Development	**0–4**	23	10
	5–6	14	53

The analyses examined whether there were differences between ASSET member schools and their matched comparison schools that varied by extent of participation (e.g., whether high participation ASSET schools outperformed their comparison schools). No significant differences by this very rough measure of participation were found on any of the five outcomes examined or on any of the achievement gaps between sub-groups of students.

Finally, HRI investigated the relationship between teacher participation in ASSET professional development and PSSA scores. The hypothesis is that students of teachers who have received more professional development should have greater learning gains than students of teachers with little or no professional development. Unfortunately, there is no way to associate individual student data with specific teachers; thus, HRI attempted to create a school level measure of participation in ASSET professional development.

ASSET provided HRI with a list of teachers who had attended professional development over the past six years. Because the extent of participation in ASSET professional development before this time period is unknown, this set of analyses was limited to the 48 elementary schools that joined the program in the last six years (i.e., schools for which all of their professional

development participation was in the data provided to HRI), further reducing the likelihood of detecting an effect if one truly exists. HRI compiled these data to calculate the total amount of professional development attended by all the teachers in each school. As can be seen in Table 13, over the six years participation in ASSET PD ranged from 5 to 227 days. On average, schools have had staff attend nearly 72 days of training over the course of their school's membership.

Table 13
Days of ASSET Professional Development

Number of Schools	Minimum	Maximum	Mean	Standard Deviation
48	5.00	227.00	71.96	51.38

As described previously, faculty rosters for the time period covered by the project records were not available, making it impossible to determine the extent of teacher turnover in these schools, or control for it, in these analyses. In addition, information on the total number of teachers in each school was not available. Consequently, total days of professional development attended may not be a good measure of participation. For example, a school with 10 teachers who attended a total of 80 days of professional development would have substantively different participation than a school with 20 teachers who also attended 80 days of training. To account for differences in the number of teachers in the member schools, HRI divided the total days of professional development attended by the number of 4th grade students in the school (as the number of students per teacher is similar across schools, the number of 4th grade students can serve as a proxy for the number of teachers in a school).

HRI examined the relationship between PD attendance and each of the five outcomes in the PSSA data, as well as whether PD attendance was related to differences in achievement gaps. The analyses found that this rough measure of participation in ASSET professional development was not significantly related to student scores on the 4th grade PSSA.

Summary

This study examined the relationship between ASSET membership and student scores on the 4th and 8th grade PSSA science, reading, and mathematics assessments. Data from both the 2007–08 and the 2008–09 PSSAs were used to examine whether scores in the treatment and comparison schools were different, as well as if they were diverging or converging. Because schools were not randomly assigned to participate in ASSET, and because member schools as a set were atypical of the state as a whole, a set of matched comparison schools was identified using information from the PSSA data files.

Five outcomes from the PSSA were examined: science scale score; score on the nature of science items; score on the disciplinary content knowledge items; reading scale score, and mathematics scale score. The analyses also investigated whether there were differences in achievement gaps

between ASSET member and comparison schools. In addition, the analyses examined the extent to which PSSA scores were related to school utilization of ASSET-provided services.

ASSET membership was a significant predictor of student scores on 4 of the 5 outcomes examined on 4th grade PSSA: science scale score; nature of science score; reading scale score; and mathematics scale score. Effect sizes for these differences ranged from 0.13 standard deviations to 0.19 standard deviations. On the disciplinary science content score, students in ASSET member schools performed similarly to students in the comparison schools. These findings were consistent across the two years of data (i.e., differences between the ASSET member and comparison schools were similar in both years).

At 8th grade, students in ASSET member schools and their demographically-similar comparison schools performed, on average, at the same level on the science scale score, nature of science score, and mathematics scale score. On both the disciplinary science content score and the reading scale score, students in schools that have been ASSET members for six or fewer years scored slightly lower than students in their comparison schools, while students in schools that have been ASSET members for more than six years had similar scores to students in their comparison schools. It is important to note though that the small number of ASSET member schools that include 8th grade made it unlikely that the analyses would find statistically significant differences. ASSET may want to consider ways to bring more middle schools into the program to allow for a better study of the impact of its services.

On each outcome examined, at both grade levels, a number of achievement gaps were identified; however, the size of the gaps did not vary between ASSET member and matched comparison schools. Consequently, ASSET may want to consider how it can help schools and teachers implement practices learned in professional development that will make it more likely that ASSET's core belief that all students can learn becomes a reality. In addition, there was no clear pattern of association between the number of years a school had been an ASSET member and the outcomes examined in this study. Finally, the very rough measures of school utilization of ASSET services were not significant predictors of PSSA scores. Future studies may want to explore ways of obtaining up-to-date faculty information from schools to help better categorize the extent of school utilization of ASSET services.

References

Bryk, A. S. & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods.* Newbury Park, CA: Sage Publications.

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41-55.

Rubin, D. B. (2001). Using propensity scores to help design observational studies: An application to the tobacco litigation. *Health Services & Outcomes Research Methodology, 2*, 169-188.

Appendix

HLM Equations, Regression Coefficients, and Standard Errors

HLM Equations

The model-building process began with an unconditional model. Next, all main effects were entered into the models, and each error term was tested to determine if the relationship between the student characteristic varied among higher-level units. If there was significant variation, school level predictors were entered. The error terms were retested and included in the final models only if significant variation among schools remained. The equations below show the base equation for each analysis.

Level 1 Model (Students)

Y = P0 + P1*(IEP) + P2*(TITLE1) + P3*(ELL) + P4*(ED) + P5*(FEMALE) + P6*(BLACK) + P7*(HISPANIC) + P8*(OTHER) + E

Level 2 Model (School*Year Combinations)

P0 = B00 + B01*(YEAR0809) + R0
P1 = B10
P2 = B20
P3 = B30
P4 = B40
P5 = B50
P6 = B60
P7 = B70
P8 = B80

Level 3 Model (Schools)

B00 = G000 + G001*(PECENT FEMALE) + G002*(PERCENT BLACK) + G003*(PERCENT HISPANIC) + G004*(PERCENT OTHER RACE) + G005*(PERCENT ED) + G006*(PERCENT IEP) + G007*(PERCENT ELL) + G008*(SIZE) + G009*(SUBURB) + G0010*(TOWN) + G0011*(RURAL) + G0012*(COHORT) + G0013*(ASSET) + G0014*(PERCENT TITLE1) + G0015*(CHARTER) + G0016*(ASSET*YRSMEMBER) + U00
B01 = G010
B10 = G100
B20 = G200
B30 = G300
B40 = G400
B50 = G500
B60 = G600
B70 = G700
B80 = G800

ASSET 4th Grade Treatment vs. Control Model
HLM Regression Coefficients (and standard errors)

	Science Scale		Nature of Science		Disciplinarily Content Knowledge		Reading Scale		Mathematics Scale	
Intercept	1459.72	(2.87)	24.22	(0.09)	23.69	(0.09)	1393.37	(3.64)	1472.51	(4.55)
School Characteristics										
ASSET School[1]	22.86*	(10.76)	0.93*	(0.34)	0.47	(0.32)	39.25*	(12.99)	45.40*	(16.73)
Years of Membership[2]										
6 years	-7.35	(10.64)	-0.01	(0.34)	-0.25	(0.31)	11.13	(12.43)	19.59	(16.10)
11 years	-1.83	(11.04)	0.12	(0.35)	-0.08	(0.32)	8.80	(13.08)	0.90	(16.85)
14-15 years	7.02	(9.78)	0.31	(0.31)	0.25	(0.29)	9.49	(11.50)	19.28	(14.83)
ASSET x Years of Membership[2]										
6 years	-25.22	(15.13)	-0.96*	(0.48)	-0.63	(0.44)	-43.72*	(17.99)	-61.70*	(23.19)
11 years	25.26	(15.59)	-0.96	(0.49)	-0.47	(0.46)	-49.45*	(18.65)	-61.33*	(24.01)
14-15 years	-21.28	(14.24)	-0.86	(0.45)	-0.38	(0.42)	-16.54	(17.00)	-52.76*	(21.91)
Charter school	39.94	(32.54)	0.94	(1.12)	0.53	(1.13)	11.98	(47.11)	36.15	(57.26)
Percent female	-68.43	(40.95)	-2.44	(1.29)	-1.95	(1.20)	-135.15*	(48.45)	-105.76	(62.26)
Percent African-American	-96.42*	(18.70)	-2.53*	(0.62)	-3.32*	(0.58)	-76.26*	(26.46)	-97.52*	(32.62)
Percent other race/ethnicity	10.15	(69.42)	0.79	(2.20)	-0.25	(2.04)	139.25	(81.28)	247.91*	(105.25)
Percent Title I	40.61*	(13.56)	1.17*	(0.43)	-0.22	(0.48)	76.80*	(17.23)	69.53*	(21.31)
Percent economically disadvantaged	-71.10*	(17.80)	-2.81*	(0.57)	0.24	(0.77)	-105.29*	(21.36)	-67.99*	(27.45)
Percent special education	-42.52	(40.62)	-0.28	(1.29)	0.72	(1.78)	34.19	(47.98)	71.47	(61.58)
Percent ELL	-149.81	(177.15)	-4.33	(5.68)	-3.10	(7.92)	-134.40	(215.69)	-311.87	(276.25)
Community Type[3]										
City	-6.68	(15.34)	0.06	(0.49)	0.74	(0.66)	-21.11	(20.10)	6.77	(25.39)
Town	-10.04	(9.36)	-0.20	(0.29)	0.00	(0.41)	-25.06*	(11.05)	-22.61	(14.31)
Rural	-27.63*	(10.27)	-0.59	(0.32)	0.01	(0.46)	-34.96*	(12.40)	-33.94*	(15.88)
School Size	-0.19*	(0.05)	-0.01*	(0.00)	0.00	(0.00)	-0.17*	(0.06)	-0.15*	(0.07)
Year										
2008-09 data[4]	20.55*	(2.64)	0.56*	(0.08)	-0.15	(0.16)	7.70*	(3.25)	7.26	(3.97)
Student Characteristics										
Female	-20.52*	(1.58)	-0.38*	(0.05)	-0.75*	(0.05)	30.26*	(1.99)	-39.49*	(2.22)
2008-09 data	—	—	—	—	0.38*	(0.11)	—	—	—	—
Race/Ethnicity[6]										
African-American	-69.48*	(3.99)	-2.52*	(0.14)	-2.14*	(0.14)	-70.68*	(6.35)	-84.65*	(7.02)
ASSET School	—	—	—	—	—	—	26.08	(22.22)	32.72	(24.76)
Years of Membership										
6 years	—	—	—	—	—	—	30.65	(20.98)	27.05	(22.98)
11 years	—	—	—	—	—	—	-3.31	(21.25)	-10.06	(23.23)
14-15 years	—	—	—	—	—	—	25.31	(19.71)	-1.75	(21.72)
ASSET x Years of Membership										
6 years	—	—	—	—	—	—	-70.02*	(30.90)	-86.45*	(34.00)
11 years	—	—	—	—	—	—	-37.13	(30.62)	-15.87	(33.51)
14-15 years	—	—	—	—	—	—	-44.91	(28.65)	-27.58	(32.05)
2008-09 data	-5.72	(6.75)	-0.20	(0.26)	-0.31	(0.25)	6.50	(8.17)	14.22	(9.01)
School demographics										
Other	-1.59	(3.93)	-0.10	(0.13)	-0.11	(0.12)	9.66	(6.96)	15.68	(8.10)
ASSET School	—	—	—	—	—	—	-22.06	(22.61)	29.60	(27.50)
Years of Membership										
6 years	—	—	—	—	—	—	-21.63	(22.08)	-26.01	(26.63)
11 years	—	—	—	—	—	—	-67.68*	(21.48)	-27.58	(26.05)
14-15 years	—	—	—	—	—	—	-51.73*	(19.09)	-34.22	(23.34)
ASSET x Years of Membership										
6 years	—	—	—	—	—	—	-18.63	(32.53)	-16.17	(39.19)
11 years	—	—	—	—	—	—	50.79	(33.57)	-16.65	(40.22)
14-15 years	—	—	—	—	—	—	65.88*	(30.01)	7.91	(36.12)
2008-09 data	4.90	(7.79)	0.15	(0.26)	0.15	(0.24)	-8.78	(9.79)	-3.57	(11.89)
School demographics										
Special Education	-109.38*	(3.26)	-3.94*	(0.12)	-3.37*	(0.11)	-192.54*	(4.51)	-180.11*	(4.95)

ASSET School	-17.20	(13.65)	-0.25	(0.51)	-0.57	(0.47)	-35.66	(19.05)	-29.93	(20.81)
Years of Membership										
6 years	-11.21	(13.49)	-0.27	(0.50)	-0.39	(0.47)	-31.74	(18.82)	-38.52	(20.56)
11 years	-8.47	(13.67)	-0.29	(0.51)	-0.48	(0.47)	-24.18	(19.14)	-17.01	(20.91)
14-15 years	-15.55	(12.32)	-0.38	(0.46)	-0.38	(0.43)	-32.58	(17.24)	-26.63	(18.83)
ASSET x Years of Membership										
6 years	11.38	(19.03)	-0.20	(0.71)	0.29	(0.66)	47.43	(26.57)	34.16	(29.05)
11 years	26.98	(19.73)	0.65	(0.73)	1.11	(0.68)	39.78	(27.51)	31.50	(30.07)
14-15 years	37.65*	(18.11)	0.74	(0.67)	0.89	(0.63)	75.48*	(25.26)	58.26*	(27.63)
2008-09 data	11.70*	(4.66)	0.74*	(0.17)	-0.15	(0.16)	11.04	(6.55)	25.57*	(6.97)
School demographics										
Title I	-104.52*	(4.72)	-3.38*	(0.19)	-3.01*	(0.18)	-139.62*	(6.18)	-136.21*	(6.50)
ASSET School	-13.96	(16.79)	-0.69	(0.66)	-0.40	(0.64)	-12.27	(21.85)	14.01	(23.30)
Years of Membership										
6 years	-10.77	(17.32)	-0.89	(0.68)	-0.38	(0.66)	-27.44	(22.11)	19.04	(23.62)
11 years	56.17*	(19.28)	1.64*	(0.75)	1.79*	(0.72)	69.94*	(24.13)	104.49	(26.49)
14-15 years	-8.32	(15.90)	-0.62	(0.63)	0.01	(0.60)	-24.22	(20.21)	-1.23	(21.79)
ASSET x Years of Membership										
6 years	38.15	(24.18)	1.44	(0.96)	1.13	(0.92)	64.29*	(31.25)	14.72	(33.23)
11 years	-30.89	(25.94)	-1.31	(1.02)	-0.70	(0.98)	-65.72*	(32.83)	-103.92*	(35.53)
14-15 years	47.82*	(22.12)	1.56	(0.88)	1.26	(0.85)	47.49	(28.93)	29.68	(30.73)
2008-09 data	3.55	(6.03)	0.34	(0.21)	-1.63	(0.20)	-1.56	(9.44)	12.12	(10.10)
School demographics										
English-language learner	-138.35*	(11.14)	-4.41*	(0.42)	-4.41*	(0.41)	-177.28*	(14.89)	-149.41*	(15.77)
2008-09 data	-19.91	(22.04)	-0.57	(0.84)	-1.27	(0.80)	13.97	(29.41)	-9.73	(30.79)
Economically disadvantaged	-53.21*	(2.10)	-1.64*	(0.07)	-1.55*	(0.08)	-69.46*	(3.12)	-73.72*	(3.65)
ASSET School	—	—	—	—	-0.74*	(0.33)	-26.00*	(12.40)	-32.17*	(14.85)
Years of Membership										
6 years	—	—	—	—	-0.42	(0.31)	-10.13	(11.84)	-8.45	(14.07)
11 years	—	—	—	—	-0.23	(0.34)	-7.97	(12.93)	-15.96	(15.35)
14-15 years	—	—	—	—	-0.34	(0.29)	-16.87	(11.03)	-15.18	(13.24)
ASSET x Years of Membership										
6 years	—	—	—	—	1.25*	(0.44)	34.86*	(16.57)	36.36	(19.82)
11 years	—	—	—	—	0.62	(0.47)	33.96	(17.78)	57.46*	(21.29)
14-15 years	—	—	—	—	0.60	(0.44)	23.69	(16.84)	36.51	(19.96)
2008-09 data	—	—	-0.23	(0.14)	—	—	—	—	-14.30*	(6.29)
School demographics										

* $p < 0.05$.

Note: All variables were grand-mean centered.

[1] Versus non-ASSET schools.

[2] Versus 1-5 years ASSET Member schools.

[3] Versus schools located in suburbs.

[4] Versus 2007-08 data.

[5] There were no clear patterns of relationship between school demographic characteristics and achievement gaps. To minimize the complexity of the regression coefficients table, these coefficients are not reported.

[6] Versus white students.

ASSET 8th Grade Treatment vs. Control Model
HLM Regression Coefficients (and standard errors)

	Science Scale		Nature of Science		Disciplinarily Content Knowledge		Reading Scale		Mathematics Scale	
Intercept	1275.57	(4.83)	19.73	(0.16)	18.98	(0.13)	1486.92	(5.21)	1385.64	(6.36)
School Characteristics										
ASSET School[1]	-18.31	(9.21)	-0.51	(0.33)	-1.18*	(0.33)	-33.57*	(13.39)	-23.64	(14.42)
11-15 Years of Membership[2]	-15.96	(10.11)	-0.35	(0.36)	-0.89*	(0.36)	-18.21	(13.93)	14.27	(15.67)
ASSET x 11-15 Years of Membership[2]	29.16	(14.18)	0.93	(0.51)	1.28*	(0.53)	38.07	(19.10)	7.73	(22.51)
Charter school	136.25	(106.91)	2.89	(3.68)	6.10*	(1.81)	175.79*	(66.67)	149.15	(81.93)
Percent female	-232.34*	(90.78)	-9.82*	(3.14)	-7.20	(3.50)	-139.10	(124.80)	-332.13*	(150.04)
Percent African-American	6.63	(22.68)	-0.10	(0.82)	0.25	(0.77)	-6.03	(28.19)	-7.23	(31.59)
Percent other race/ethnicity	73.15	(136.09)	1.90	(4.92)	2.16	(5.02)	85.90	(183.59)	191.65	(211.95)
Percent Title I	91.02*	(27.49)	3.36*	(0.94)	3.90*	(0.98)	184.62*	(35.50)	-14.31	(40.02)
Percent economically disadvantaged	-193.05*	(28.88)	-6.01*	(1.04)	-7.93*	(1.04)	-246.54*	(38.01)	-141.25*	(43.36)
Percent special education	82.86	(80.79)	2.75	(2.91)	4.01	(2.93)	3.71	(117.01)	253.59	(126.10)
Percent ELL	795.93	(434.67)	39.45*	(15.90)	21.67	(16.05)	833.31	(585.04)	446.88	(682.82)
Community Type[3]										
City	-43.64	(101.63)	0.15	(3.48)	-3.13*	(1.47)	-18.83	(52.95)	-31.31	(68.98)
Town	22.01	(18.01)	0.96	(0.66)	0.26	(0.63)	-19.40	(25.19)	34.77	(26.61)
Rural	-21.52	(12.92)	-0.79	(0.46)	-0.68	(0.46)	-9.16	(19.68)	-60.15*	(20.37)
School Size	0.01	(0.04)	0.00	(0.00)	-0.00	(0.00)	0.05	(0.05)	-0.03	(0.06)
Year										
2008-09 data[4]	15.01*	(6.08)	1.13*	(0.20)	1.36*	(0.18)	28.15*	(8.96)	23.66*	(10.01)
Student Characteristics										
Female	-27.57*	(2.60)	-0.49*	(0.09)	-1.16*	(0.09)	48.67*	(3.75)	-11.84*	(3.62)
Race/Ethnicity[5]										
African-American	-95.30*	(6.50)	-3.35*	(0.24)	-3.19*	(0.19)	-96.10*	(9.99)	-91.99*	(9.34)
2008-09 data	-15.10	(10.28)	-0.48	(0.39)	-0.66*	(0.31)	18.44	(14.28)	6.70	(7.92)
Other	-11.90	(10.54)	-0.62	(0.37)	-0.25	(0.25)	0.17	(13.78)	21.12	(16.07)
2008-09 data	21.59	(20.67)	0.54	(0.74)	0.95	(0.49)	17.87	(27.01)	7.39	(21.43)
Special Education	-165.80*	6.19	-5.90*	(0.20)	-5.57*	(0.16)	-293.95*	(6.86)	-226.48*	(9.97)
ASSET School	—	—	—	—	0.21	(0.45)	-1.30	(19.46)	—	—
11-15 Years of Membership	—	—	—	—	0.69	(0.52)	-17.91	(22.58)	—	—
ASSET x 11-15 Years of Membership	—	—	—	—	-0.95	(0.70)	8.00	(30.24)	—	—
2008-09 data	-7.73	12.15	-0.15	(0.39)	-0.49	(0.27)	-1.02	(11.84)	24.16*	(11.03)
School demographics[6]										
Title I	-111.84*	(16.34)	-4.04*	(0.53)	-3.25*	(0.67)	-129.98*	(24.84)	-82.68*	(33.74)
2008-09 data	17.67	(18.35)	0.42	(0.53)	0.51	(0.85)	19.05	(29.54)	20.84	(22.78)
English-language learner	-153.37*	(16.97)	-5.08*	(0.59)	-5.45*	(0.58)	-280.43*	(25.44)	-159.78*	(24.15)
Economically disadvantaged	-44.52*	(5.99)	-1.55*	(0.21)	-1.64*	(0.14)	-82.96*	(6.50)	-62.99*	(6.42)
ASSET School	-3.45	(11.05)	0.07	(0.38)	—	—	—	—	—	—
11-15 Years of Membership	6.58	(12.11)	0.41	(0.41)	—	—	—	—	—	—
ASSET x 11-15 Years of Membership	-1.10	(17.30)	-0.22	(0.59)	—	—	—	—	—	—
2008-09 data	-16.39*	(6.66)	-0.64*	(0.23)	-0.47	(0.27)	-2.47	(12.78)	-11.01	(8.49)
School demographics										

* $p < 0.05$.

Note: All variables were grand-mean centered.

[1] Versus non-ASSET schools.

[2] Versus 1-6 years ASSET Member schools.

[3] Versus schools located in suburbs.

[4] Versus 2007-08 data.

[5] Versus white students.

[6] There were no clear patterns of relationship between school demographic characteristics and achievement gaps. To minimize the complexity of the regression coefficients table, these coefficients are not reported.

ASSET 4th Grade Extent of Participation
HLM Regression Coefficients (and standard errors)

	Science Scale		Nature of Science		Disciplinarily Content Knowledge		Reading Scale		Mathematics Scale	
Intercept	1475.67	(3.84)	24.83	(0.12)	24.53	(0.13)	1406.72	(4.07)	1483.42	(5.84)
School Characteristics										
High Participation Level[1]	-4.62	(6.94)	0.01	(0.18)	-0.02	(0.19)	3.43	(6.81)	-2.53	(8.89)
ASSET School[2]	7.79	(5.85)	0.43*	(0.18)	0.30	(0.19)	16.17*	(6.56)	10.64	(9.18)
Charter school	25.93	(37.87)	0.69	(1.37)	0.01	(1.41)	19.39	(41.71)	37.85	(65.53)
Percent female	-60.31	(47.93)	-2.47	(1.41)	-1.59	(1.47)	-52.27	(50.29)	-37.60	(71.09)
Percent African-American	-91.39*	(20.95)	-1.43*	(0.69)	-2.28*	(0.73)	-28.72	(23.31)	-56.75	(37.59)
Percent other race/ethnicity	46.51	(76.87)	1.18	(2.26)	0.51	(2.39)	217.20*	(80.98)	192.44	(113.75)
Percent Title I	87.78*	(19.00)	2.83*	(0.57)	2.45*	(0.60)	170.69*	(22.08)	159.70*	(29.58)
Percent economically disadvantaged	-84.82*	(21.39)	-3.57*	(0.65)	-2.47*	(0.67)	-166.04*	(23.32)	-112.44*	(33.03)
Percent special education	-12.03	(48.68)	-0.17	(1.46)	0.13	(1.53)	71.33	(52.70)	91.12	(73.11)
Percent ELL	-81.38	(208.96)	-8.85	(8.39)	-2.99	(6.55)	-204.01	(224.60)	-38.59	(330.24)
High Participation Level	—	—	-1.43	(15.16)	—	—	—	—	—	—
Community Type[3]										
Suburb	-6.29	(18.25)	-0.26	(0.56)	0.15	(0.57)	-12.57	(19.69)	-37.85	(28.53)
Town	-36.30	(20.85)	-1.04	(0.64)	-0.55	(0.66)	-55.83*	(22.37)	-79.47*	(32.29)
Rural	-24.01	(22.18)	-0.68	(0.69)	-0.29	(0.70)	-42.53	(23.66)	-75.44*	(34.29)
School Size	-0.18*	(0.05)	-0.01*	(0.00)	-0.01*	(0.00)	-0.17*	(0.06)	-0.15	(0.08)
Student Characteristics										
Female	-16.18*	(2.39)	-0.34*	(0.08)	-0.56*	(0.08)	33.51*	(2.99)	-41.32*	(3.32)
Race/Ethnicity[4]										
African-American	-76.93*	(5.31)	-2.54*	(0.23)	-2.22*	(0.23)	-78.00*	(6.66)	-93.30*	(10.21)
ASSET School	—	—	-0.33	(0.38)	-0.01	(0.38)	—	—	19.98	(16.54)
School demographics[5]										
Other	3.50	(5.61)	-0.00	(0.28)	-0.09	(0.27)	13.67	(7.04)	29.26*	(12.84)
ASSET School	—	—	0.56	(0.40)	0.00	(0.39)	—	—	11.30	(19.90)
School demographics										
Special Education	-101.65*	(4.60)	-3.48*	(0.16)	-3.41*	(0.16)	-183.18*	(6.61)	-168.52*	(6.90)
ASSET School	16.83	(9.19)	0.53	(0.33)	0.49	(0.32)	25.14	(13.46)	15.50	(13.95)
School demographics										
Title I	-123.73*	(6.29)	-3.83*	(0.23)	-3.54*	(0.25)	-171.54*	(7.79)	-166.91*	(8.75)
ASSET School	0.22	(10.96)	0.22	(0.42)	-0.05	(0.47)	17.57	(13.32)	15.04	(15.04)
School demographics										
English-language learner	-141.48*	(18.94)	-4.29*	(0.74)	-4.63*	(0.66)	-167.39*	(18.84)	-158.38*	(19.85)
High Participation Level	-37.04	(37.70)	-1.32	(1.48)	-1.31	(1.33)	—	—	—	—
Economically disadvantaged	-57.21*	(3.19)	-1.72*	(0.11)	-1.69*	(0.12)	-74.60*	(4.00)	-83.62*	(5.87)
ASSET School	—	—	—	—	-0.30	(0.23)	—	—	-9.22	(11.13)
School demographics										

* $p < 0.05$.

Note: All variables were grand-mean centered.

[1] Versus schools with low level of participation

[2] Versus non-ASSET schools.

[3] Versus schools located in cities.

[4] Versus white students.

[5] There were no clear patterns of relationship between school demographic characteristics and achievement gaps. To minimize the complexity of the regression coefficients table, these coefficients are not reported.

ASSET 4th Grade Participation in Professional Development
HLM Regression Coefficients (and standard errors)

	Science Scale		Nature of Science		Disciplinarily Content Knowledge		Reading Scale		Mathematics Scale	
Intercept	1472.21	(4.75)	24.64	(0.14)	24.22	(0.16)	1404.67	(4.21)	1490.35	(6.30)
School Characteristics										
Days of PD[1]	-5.16	(3.63)	-0.16	(0.10)	-0.19	(0.11)	-4.40	(3.88)	-3.22	(5.55)
ASSET School[2]	17.06*	(6.97)	0.68*	(0.22)	0.60*	(0.23)	14.19	(9.19)	28.71*	(10.24)
Days of PD	—	—	—	—	—	—	-8.30	(7.87)	—	—
Charter school	105.43*	(51.14)	3.22*	(1.57)	-1.15	(3.31)	36.49	(45.33)	109.56	(70.82)
Percent female	-124.41*	(57.55)	-3.11	(1.73)	-3.26	(1.82)	-78.20	(58.78)	-22.72	(84.51)
Percent African-American	-72.96*	(24.49)	-2.17*	(0.76)	-3.39*	(0.94)	-32.23	(25.07)	-45.75	(34.36)
Percent other race/ethnicity	-211.47	(125.25)	-3.44	(3.68)	-7.33	(3.95)	244.25*	(120.38)	39.88	(188.96)
Percent Title I	96.74*	(26.12)	3.17*	(0.82)	2.90*	(0.87)	190.80*	(22.58)	179.33*	(26.58)
Percent economically disadvantaged	-123.99*	(26.11)	-4.27*	(0.79)	-2.92*	(0.85)	-120.45*	(27.70)	-148.55*	(38.67)
Percent special education	-4.52	(56.71)	1.28	(1.72)	-1.16	(1.84)	63.34	(61.31)	94.13	(84.06)
Percent ELL	-400.24	(339.37)	-20.75*	(10.06)	-15.67	(10.71)	-279.82	(298.80)	-138.93	(516.56)
Community Type[3]										
Suburb	17.50	(21.12)	0.23	(0.64)	0.78	(0.69)	15.01	(19.05)	-30.91	(28.43)
Town	-12.83	(21.49)	-0.58	(0.65)	-0.30	(0.70)	-27.34	(18.76)	-84.70*	(29.99)
Rural	-29.89	(23.08)	-1.12	(0.69)	-0.42	(0.77)	-41.05	(20.68)	-81.54*	(32.97)
School Size	-0.24*	(0.06)	-0.01*	(0.00)	-0.01*	(0.00)	-0.23*	(0.07)	-0.33*	(0.09)
Student Characteristics										
Female	-12.26*	(3.16)	-0.20	(0.11)	-0.37*	(0.12)	42.13*	(4.03)	-34.24*	(4.40)
ASSET School	—	—	—	—	0.05	(0.24)	—	—	—	—
School demographics[4]										
Race/Ethnicity[5]										
African-American	-64.51*	(7.21)	-2.46*	(0.24)	-1.22*	(0.37)	-69.40*	(9.19)	-74.26*	(10.03)
ASSET School	—	—	—	—	0.76	(0.56)	—	—	—	—
School demographics										
Other	13.07	(8.32)	0.25	(0.28)	0.13	(0.46)	20.70*	(10.61)	36.25*	(11.56)
ASSET School	—	—	—	—	0.04	(0.68)	—	—	—	—
School demographics										
Special Education	-104.99*	(6.24)	-3.70*	(0.22)	-3.43*	(0.23)	-189.93*	(8.38)	-170.28*	(7.33)
ASSET School	-14.99	(12.67)	-0.34	(0.45)	-0.47	(0.47)	-35.48	(17.19)	-53.84*	(14.08)
School demographics										
Title I	-115.38*	(8.61)	-3.64*	(0.29)	-3.74*	(0.28)	-169.63*	(8.28)	-154.37*	(9.02)
ASSET School	8.82	(14.92)	0.65	(0.49)	0.30	(0.51)	—	—	—	—
School demographics										
English-language learner	-160.23*	(19.71)	-5.28*	(0.66)	-6.29*	(0.71)	-172.00*	(27.40)	-176.67*	(27.32)
Days of PD	—	—	—	—	-1.74	(0.53)	—	—	—	—
Economically disadvantaged	-55.81*	(4.20)	-1.75*	(0.14)	-1.65*	(0.17)	-74.58*	(5.34)	-80.14*	(5.82)
ASSET School	—	—	—	—	0.21	(0.32)	—	—	—	—
School demographics										

* $p < 0.05$.

Note: All variables were grand-mean centered.

[1] The days of PD per student variable was transformed by multiplying it by 10 and taking the square root in order to normalize its distribution.

[2] Versus non-ASSET schools.

[3] Versus schools located in cities.

[4] There were no clear patterns of relationship between school demographic characteristics and achievement gaps. To minimize the complexity of the regression coefficients table, these coefficients are not reported.

[5] Versus white students.