Appendix A

Staff Survey Initiative-based Professional Development and Support Items

Measure	Item
Professional developments	
Staff attending training during the past academic year	Did you attend any professional development opportunities during the past academic year (on any subject/topic)? If so, approximately how many sessions?
Staff attending training related to STEM activities during the past academic year	Did you attend any STEM-related professional development opportunities during the past academic year? If so, approximately how many sessions?
Frequency of staff meetings to discuss program issues	How often do you meet with other staff at this afterschool program to discuss program issues (without students)?
Frequency of staff meetings to discuss STEM programming	How often do you meet with other staff at this afterschool program to discuss STEM programming (without students)?
Frequency of staff meetings with classroom teachers to discuss STEM concepts being taught in school	During this past academic year, how often did you discuss STEM concepts being taught in school with classroom teachers?
Program offerings	
Frequency of meetings with parents about STEM activities	During this past academic year, how often did you talk with parents about STEM activities in the program (e.g. individually, over the phone, sent information)?
Frequency of staff holding STEM related events or meetings for parents	During this past academic year, how often did you hold STEM-related events or meetings for parents (e.g., science fair, family math night)?

Appendix B

Staff Survey Belief and Efficacy Items

Staff survey items
Beliefs about the importance of STEM learning (7 items, pre-α = .73 / post-α = .79)
I think most program directors expect staff to do hands-on activities in the afterschool program.
In general, I think these students (in the afterschool program) are very capable of doing hands-on science activities.
In general, I think most of these students have a hard time understanding STEM concepts.
In general, I feel well-prepared to teach hands-on STEM concepts/activities.
I think the students enjoy doing STEM activities.
I think the students see the relevance of the STEM activities we do in the program to "real life."
I think students look forward to coming to the afterschool program when we have STEM activities going on.
I don't think there is enough time here at the program for students to learn much about STEM.
Efficacy for implementing STEM activities (7 items, pre-α = .77 / post-α = .79)
Overall I am satisfied with the STEM experiences that students are having in the program.
I have a strong background in at least one area of Science, Technology, Engineering, and/or Mathematics.
Science, Technology, Engineering, and/or Mathematics are important subjects for students to learn.
I do not know enough about Science, Technology, Engineering, and/or Mathematics to teach any of them well.
I do not have enough support from the afterschool program to teach hands-on STEM curriculum.
I enjoy teaching Science, Technology, Engineering, and/or Mathematics (STEM activities).
I feel confident about teaching Science, Technology, Engineering, and/or Mathematics in the afterschool program.

Appendix C

Student Items

Measure and items	Reliability pre/post
Work habits (6 items)	α = .77 / α = .81
I follow the rules in my classroom	
I work well by myself	
I am careful and neat with my work	
I make good use of time at school	
I finish my work on time	
I keep track of my things at school	
Reading efficacy (4 items)	α = .81 / α = .84
I am interested in reading	
I am good at reading	
I expect to do well in reading this year	
I would be good at learning something new in reading	
Math efficacy (4 items)	α = .86 / α = .88
I am interested in math	
I am good at math	
I expect to do well in math this year	
I would be good at learning something new in math	
Science efficacy (4 items)	α = .87 / α = .89
I am interested in science	
I am good at science	
I expect to do well in science this year	
I would be good at learning something new in science	
Social competencies (7 items)	α = .88 / α = .90
I work well with other kids.	
I can make friends with other kids.	
I can talk with people I don't know	
I can tell other kids they are doing something I don't like	
I can tell a funny story to a group of kids	
I can stay friends with other kids	
I can tell other kids what I think even if they disagree with me	
Science interest (22 items)	α = .93 / α = .95
Science is something I get excited about	
I like to take things apart to learn more about them	
I like to participate in science projects	
I'd like to get a science kit as a gift (for example, a microscope, magnifying glass, a robot, etc.)	
I like to see how things are made (for example, ice-cream, a TV, an iPhone, energy, etc.)	
I like to watch programs on TV about nature and discoveries	
I am curious to learn more about science, computers, or technology	
I like to work on science activities	

When I grow up and have kids, I will take them to a science museum	
I would like to have a science or computer job in the future	
I want to understand science (for example, to know how computers work, how rain forms, or how airplanes fly)	
I enjoy visiting science museums or zoos	
I get excited about learning new discoveries or inventions	
I like reading science magazines	
I pay attention when people talk about recycling to protect our environment	
I am curious to learn more about cars that run on electricity	
I get excited to find out that I will be doing a science activity	
I enjoy reading science fiction books	
I do science-related activities that are not for schoolwork	
I like science	
Science is one of my favorite subjects	
I take science only because it will help me in the future	
Science career (4 items)	$\alpha = .85$ / $\alpha = .86$
I will have a career in Science, Technology, Engineering, or Mathematics	
I will make it into a good college and major in an area needed for a career in Science, Technology, Engineering, or Mathematics	
I will graduate with a college degree in a major needed for a career in science	
I will get a job in a science-related area	
Likelihood of future success (7 items)	$\alpha = .91$ / $\alpha = .92$
I will graduate from high school	
I will go to college	
I will have a job that pays well	
I will be able to own my own home	
I will have a job that I enjoy doing	
I will have a happy family life	
I will be respected in my community	

Appendix D

Tables 1 through 8

Table D1

Demographic and Educational Background of Program Staff: Fall, 2013 (N = 178 staff)

	obs.	mean/%
Gender		
Female	128	72%
Male	50	28%
Race/ethnicity		
African American	11	6%
American Indian	2	1%
Asian	14	8%
Filipino	5	3%
Hispanic	82	46%
Pacific Islander	5	3%
White	45	25%
Other	9	5%
Age		
18-25 years	87	49%
26-35 years	53	30%
36-45 years	20	11%
46-55 years	7	4%
over 55 years	5	3%
Educational background		
High school diploma or GED	18	10%
Attended classes/training not related to a degree	5	3%
Attended college	59	33%
Completed two-year college degree (AA)	28	16%
Completed four-year college degree (BA)	45	25%
Attended graduate school	9	5%
Completed Master's degree	7	4%
Completed Doctoral degree	2	1%
Professional experience		
School administrator	12	7%
Student Support Staff (e.g., social worker, psychologist, nurse)	18	10%
Administrative staff (e.g., office manager, receptionist)	34	19%
Classroom teacher	37	21%
Instructional specialist (e.g., music, art, special education, ELL)	41	23%
Classroom aide, teaching assistant	91	51%
Afterschool program administrator or program coach	5	3%
Afterschool program site coordinator	37	21%

Afterschool program staff (leads activities, works with students)	109	61%
Length of time in current position		
Less than 6 months	52	29%
6-11.9 months	18	10%
1-2.9 years	14	8%
3-5.9 years	21	12%
6-9.9 years	20	11%
10 years or more	4	2%

Notes. All variables are dummy variables on a scale = 0-1 (1 = yes, 0 = no).

Table D2

Descriptive information for STEM activities implemented (N = 2,457 activities)

	Obs.	Mean /%	SD	Min.	Max.
STEM content area					
Science	1355	55%		0.00	1.00
Technology	786	32%		0.00	1.00
Engineering	510	21%		0.00	1.00
Math	942	38%		0.00	1.00
Number of Students	2424	27.9	19.83	0.00	130.00
Duration	2437	2.65	1.01	1.00	5.00
Grade					
First	602	24.5%		0.00	1.00
Second	847	34.5%		0.00	1.00
Third	1117	45.5%		0.00	1.00
Fourth	1336	54.4%		0.00	1.00
Fifth	1164	47.4%		0.00	1.00
Sixth	683	27.8%		0.00	1.00
Seventh	228	9.3%		0.00	1.00
Eighth	168	6.8%		0.00	1.00
Ninth	4	0.2%		0.00	1.00
Tenth	4	0.2%		0.00	1.00
Eleventh	4	0.2%		0.00	1.00
Twelfth	4	0.2%		0.00	1.00
Measures of activity quality					
Student engagement	2427	3.48	0.65	1.00	4.00
Overall activity quality	2410	3.43	0.67	1.00	4.00

Note. STEM content area and grade variables are dummy variables on a scale = 0-1 (1 = yes, 0 = no); duration variable coded as 1 = 15-29 minutes, 2 = 30-44 minutes, 3 = 45-59 minutes, 4 = 60-89 minutes, 5 = 90-120 minutes; student engagement coded as 1 = not at all engaged, 2 = somewhat engaged, 3 = mostly engaged, 4 = very engaged; overall activity quality coded as 1 = not well at all, somewhat well, mostly well, very well.

Table D3

Standardized regression coefficients predicting staff beliefs about the importance of STEM learning (N= 90 staff)

Dependent variable = staffs' spring, 2014 beliefs							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Professional developments							
Staff attending training during the past academic year	**0.32****						
	(0.11)						
Staff attending training related to STEM activities during the past academic year		**0.29****					
		(0.10)					
Frequency of staff meetings to discuss program issues			**0.29***				
			(0.12)				
Frequency of staff meetings to discuss STEM programming				**0.27***			
				(0.12)			
Frequency of staff meetings with classroom teachers to discuss STEM concepts being taught in school					0.16		
					(0.11)		
Program Offerings							
Frequency of meetings with parents about STEM activities						0.14	
						(0.11)	
Frequency of staff holding STEM related events or meetings for parents							0.04
							(0.12)
Gender							
Male	-0.28	-0.22	-0.28	-0.23	-0.18	-0.18	-0.21
	(0.24)	(0.23)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)
Race/ethnicity							
Hispanic	-0.28	-0.23	-0.18	-0.23	-0.23	-0.20	-0.20
	(0.27)	(0.27)	(0.27)	(0.28)	(0.27)	(0.27)	(0.28)
Other	-0.07	0.02	-0.09	-0.12	-0.14	-0.06	-0.02
	(0.29)	(0.30)	(0.30)	(0.31)	(0.30)	(0.30)	(0.30)
Constant	0.20	0.14	0.20	0.22	0.17	0.16	0.16
	(0.22)	(0.22)	(0.23)	(0.24)	(0.23)	(0.23)	(0.24)
R^2	0.115	0.101	0.082	0.071	0.034	0.034	0.017
Observations	87	89	90	89	90	90	90

Notes. Standard errors in parentheses; training scales = 1 – 6; meeting scales = 1 – 7; controls are in reference to White, Female staff; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D4

Standardized regression coefficients examining relations between professional development and staff feelings of efficacy when implementing STEM activities (N= 90 staff)

Dependent variable = staffs' spring, 2014 efficacy							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Professional developments							
Staff attending training during the past academic year	**0.29***						
	(0.11)						
Staff attending training related to STEM activities during the past academic year		0.20					
		(0.11)					
Frequency of staff meetings to discuss program issues			**0.30****				
			(0.11)				
Frequency of staff meetings to discuss STEM programming				**0.36****			
				(0.11)			
Frequency of staff meetings with classroom teachers to discuss STEM concepts being taught in school					**0.28***		
					(0.11)		
Program offerings							
Frequency of meetings with parents about STEM activities						**0.23***	
						(0.11)	
Frequency of staff holding STEM related events or meetings for parents							-0.02
							(0.12)
Gender							
Male	-0.08	-0.04	-0.03	0.00	0.05	0.10	0.06
	(0.24)	(0.23)	(0.23)	(0.22)	(0.23)	(0.23)	(0.24)
Race/ethnicity							
Hispanic	-0.13	-0.10	-0.12	-0.22	-0.19	-0.15	-0.11
	(0.26)	(0.27)	(0.26)	(0.26)	(0.26)	(0.27)	(0.28)
Other	0.26	0.34	0.23	0.18	0.08	0.16	0.26
	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)	(0.30)
Constant	0.01	-0.04	0.02	0.07	0.03	-0.01	-0.06
	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(0.22)	(0.23)
R^2	0.11	0.07	0.11	0.15	0.09	0.07	0.03
Observations	87	89	90	89	90	90	90

Notes. Standard errors in parentheses; training scales = 1 – 6; meeting scales = 1 – 7; meetings with teachers scale = 1 – 6; controls are in reference to White, Female staff; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D5

Standardized regression coefficients of staff beliefs about the importance of STEM learning predicting measures of STEM activity quality (N= 1,052 activities)

	Student engagement	Overall activity quality
	(1)	(2)
Staff beliefs about the importance of STEM learning[a]	**0.25*****	**0.14*****
	(0.03)	**(0.03)**
Controls		
Male	0.13***	0.26***
	(0.03)	(0.04)
Hispanic	-0.19***	-0.27***
	(0.06)	(0.06)
Other	-0.15**	-0.41***
	(0.05)	(0.05)
Number of students in activity	-0.14***	-0.22***
	(0.03)	(0.03)
Constant	-0.11***	-0.07*
	(0.03)	(0.03)
R^2	0.09	0.13
Observations	1,241	1,237

Notes. [a] Represents a site-level mean of the measure; standard errors in parentheses; controls are in reference to White, Female staff; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D6

Standardized regression coefficients of staff efficacy for implementing STEM activities predicting measures of STEM activity quality (N= 1,052 activities)

	Student engagement	Overall activity quality
	(1)	(2)
Staff efficacy for implementing STEM activities[a]	**0.27*****	**0.09****
	(0.03)	**(0.03)**
Controls		
Male	0.17***	0.28***
	(0.03)	(0.04)
Hispanic	-0.11*	-0.20***
	(0.05)	(0.06)
Other	-0.11*	-0.38***
	(0.05)	(0.05)
Number of students in activity	-0.16***	-0.23***
	(0.03)	(0.03)
Constant	-0.08**	-0.05
	(0.03)	(0.03)
R^2	0.11	0.12
Observations	1,241	1,237

Notes. [a] Represents a site-level mean of the measure; standard errors in parentheses; controls are in reference to White, Female staff; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D7

Standardized regression coefficients of staff reports of student engagement during STEM activities predicting relative changes in student outcomes (N = 1,372 students)

Dependent variable = student outcomes in the spring of 2014						
	Work habits	Math efficacy	Science Efficacy	Social competency	Science interest	Science career aspirations
	(1)	(2)	(3)	(4)	(5)	(6)
Student engagement[a]	**0.06****	**0.13*****	**0.03**	**0.18*****	**0.08*****	-0.04
	(0.02)	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**	(0.02)
Controls						
Male	-0.11*	0.22***	0.35***	0.17***	0.38***	0.56***
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Student baseline measures in the fall 2013						
Work habits	0.52***					
	(0.02)					
Math efficacy		0.47***				
		(0.02)				
Science efficacy			0.59***			
			(0.02)			
Social competency				0.44***		
				(0.02)		
Science interest					0.57***	
					(0.02)	
Science career aspirations						0.50***
						(0.02)
Constant	0.02	-0.14***	-0.20***	-0.09**	-0.20***	-0.31***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
R^2	0.35	0.24	0.39	0.23	0.35	0.32
Observations	1,372	1,365	1,365	1,365	1,363	1,346

Notes. [a] Represents a site-level mean; standard errors in parentheses; controls are in reference to Female students; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table D8

Standardized regression coefficients of overall STEM activity quality predicting changes in student outcomes (N = 1,372 students)

Dependent variable = student outcomes in the spring of 2014						
	Work habits	Math efficacy	Science Efficacy	Social competency	Science interest	Science career aspirations
	(1)	(2)	(3)	(4)	(5)	(6)
Overall activity quality[a]	**0.08*****	**0.14*****	**0.04**	**0.20*****	**0.11*****	-0.04
	(0.02)	**(0.02)**	**(0.02)**	**(0.02)**	**(0.02)**	(0.02)
Controls						
Male	-0.11*	0.22***	0.35***	0.19***	0.38***	0.55***
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)
Student outcomes in the fall of 2013						
Work habits	0.52***					
	(0.02)					
Math efficacy		0.47***				
		(0.02)				
Science efficacy			0.59***			
			(0.02)			
Social competency				0.46***		
				(0.02)		
Science interest					0.57***	
					(0.02)	
Science career aspirations						0.50***
						(0.02)
Constant	0.01	-0.14***	-0.20***	-0.10***	-0.20***	-0.31***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
R^2	0.35	0.24	0.40	0.24	0.36	0.32
Observations	1,372	1,365	1,365	1,365	1,363	1,346

Notes. [a] Represents a site-level mean; standard errors in parentheses; controls are in reference to Female students; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.