STEM Pathways Student Survey Results through 2015-16 School Year

AUGUST 2016

Prepared by:
Dan Mueller and Edith Gozali-Lee

451 Lexington Parkway North | Saint Paul, Minnesota 55104
651-280-2700 | www.wilderresearch.org

Wilder Research
Information. Insight. Impact.

Contents

Figures

Acknowledgement

Funding from Department of Defense STARBASE and Boston Scientific supported the evaluation and the project coordination throughout the three-year STEM Pathways project. Additional funding to support the project was provided by Pentair Foundation in 2016. Partner organizations provided substantial in-kind contributions to the project, including staff time and subsidized program fees.

Summary

STEM Pathways aims to increase youths' long-term interest, learning and achievement in STEM through a deliberate and interconnected system of STEM learning opportunities. STEM Pathways is a partnership between five informal STEM organizations—The Bakken, Bell Museum of Natural History, Minnesota Zoo, STARBASE Minnesota, and The Works—and the Minneapolis Public Schools (MPS) and the Minnesota Department of Education (MDE), that tests a model for collaboration that could be expanded and replicated across more grade levels, schools, organizations and communities.

As part of the evaluation of the STEM Pathways program, students were given a survey measuring STEM awareness, attitudes, interests, and activities. The same survey items were administered to students on multiple occasions to assess any changes in their responses to them during their exposure to STEM Pathways programming.

Student survey results through spring of 2016 are reported for two cohorts of students attending the six STEM Pathways schools in Minneapolis Public Schools (MPS). The first cohort of students (Cohort 1) attended STEM Pathways schools for two years, 2014-15 as fourth graders and 2015-16 as fifth graders, experiencing two years of STEM Pathways programming. The student survey was administered to this cohort in fall 2014 (baseline assessment), and repeated in spring 2015 and spring 2016, providing the opportunity to examine potential changes in their survey responses over two school years. The second cohort (Cohort 2), who were fourth graders in the 2015-16 school year, experienced one year of STEM Pathways programming. They took the survey in the fall of 2015 (baseline assessment) and then again in the spring of 2016, providing the opportunity to examine potential changes in their survey responses from the beginning to the end of the 2015-16 school year. Changes found in students' survey responses over time may be associated with participation in STEM Pathways. However, caution is needed in attributing them solely to STEM Pathways because other STEM experiences students may have had in and out of school during the same period could have contributed to the changes as well.

Student survey results are reported for those who completed all or most of the survey each time it was administered to their class. For Cohort 1 (fifth graders in 2015-16), a total of 255 students completed all or most of the survey the three times it was administered over two school years. For Cohort 2 (fourth graders in 2015-16), a total of 345 students completed all or most of the survey in both the fall of 2015 and the spring of 2016. Cohort 2 survey responses are compared to those of Cohort 1 in fourth grade. A total of 16 close-ended survey items were included at all the survey administration points. Response options to the survey items were: don't agree, agree a little, mostly agree, agree a lot, and don't know.

Those who agreed a lot or agreed mostly were considered to be in agreement with an item. Results for these items are organized and reported in the following topic areas: awareness and relevance of STEM, STEM interest and confidence in STEM abilities, interest in STEM subjects, application of STEM to problem solving, and careers using STEM.

Overall pattern of results

The comparison between fourth-grade survey results of Cohort 2 in 2015-16 and Cohort 1 in 2014-15 indicates that overall Cohort 2 had stronger results. For example, statistically significant improvement in results (i.e., greater agreement with survey items from fall to spring) occurred for 9 of the 16 survey items in Cohort 2 compared with 6 of 16 for Cohort 1. For four of the five survey topic areas, Cohort 2 had larger increases in agreement with survey items than Cohort 1 or higher percentages agreeing with the items at the end of the school year, or both. These results may be related to the STEM Pathways program being more fully implemented in the second year than in the first year.

For Cohort 1, survey results were stronger overall at the end of their fifth-grade year (spring 2016) than they were after the end of their fourth-grade year. That is, the percentages agreeing with the survey items at the end of fifth grade were either higher or about the same as they were at the end of fourth grade. Two items that did not have statistically significant increases in agreement at the end of fourth grade (knowing about STEM-related activities outside of school and liking to learn technology) did have significant increases by the end of fifth grade, and one item that had a significant decrease in agreement after the first year (being really good at STEM) had a significant increase in agreement the second year. When the terms "significant" and "not significant" are used in describing changes in agreement with survey items, these terms are referring to the results of the statistical tests.

Results by topic area

Awareness and relevance of STEM

Students' awareness of STEM and belief in its relevance increased in both cohorts. For Cohort 2 fourth graders, agreement increased significantly from fall to spring for three of the four items in this topic area. These three items concerned the importance of STEM knowledge to students' futures, their awareness of STEM in the world around them, and their knowledge of STEM-related out-of-school activities. In Cohort 1, agreement with the first two items also increased significantly in the fourth-grade year and continued to increase slightly in the fifth-grade year. Agreement with the third item (their knowledge of STEM-related out-of-school activities) increased significantly in fifth grade and was a

significant increase over the two-year assessment period. Agreement with a fourth item in this topic area (frequently doing STEM-related out-of-school activities) did not change significantly in either cohort over time.

STEM interest and confidence in STEM abilities

Agreement with two of the four items in this topic area increased significantly from fall to spring among Cohort 2 fourth graders. These two items concerned liking to learn STEM and being really good at STEM. In Cohort 1 agreement with liking to learn STEM increased significantly in fourth grade but agreement with being really good at STEM decreased significantly. However, agreement with this latter item increased significantly in fifth grade so that the level of agreement at the end of fifth was nearly the same as at the beginning of fourth grade. Agreement with the other two items in this topic area (wanting to do more STEM-related activities and thinking one would be good at a job that uses STEM) did not change significantly in either cohort over time.

Interest in STEM subjects

Students were asked if they liked learning each of the four STEM subjects. The percentage of fourth graders in Cohort 2 and Cohort 1 agreeing that they liked learning engineering increased sharply from fall to spring. In Cohort 1, the increase in agreement with the item seen at the end of fourth grade was maintained at the end of fifth grade. Relatively high percentages of fourth graders in both cohorts agreed that they liked learning the other three STEM subjects (science, technology, and math) in both the fall and the spring. In Cohort 2, agreement with liking science decreased a small amount (but statistically significant) from fall to spring. In Cohort 1, the percentage agreeing that they liked learning technology increased significantly from the beginning of fourth grade to the end of fifth grade.

Application of STEM to problem-solving

Agreement of Cohort 2 fourth graders with the two items on applying STEM to problem-solving increased significantly from fall to spring. These two items concerned using technology to solve problems and thinking like an engineer to design solutions to problems. Among fourth graders in Cohort 1, there was a significant increase in agreement with the engineering item but not with the technology item. The increase in the engineering item was maintained through fifth grade.

Careers using STEM

In both cohorts, fourth graders' agreement increased significantly for the item concerning knowing about many jobs that use STEM. In Cohort 1, this agreement continued to increase in fifth grade. Agreement with two other career-related items did not change significantly in fourth grade in either cohort, one about being good at STEM (mentioned above) and another about wanting to have a job that uses STEM. Slightly over half of fourth graders agreed with these items. The level of agreement with these items did not change over the two school years in Cohort 1.

Results by student characteristics

The survey results were examined for differences by student demographic characteristics (gender, free/reduced-price lunch eligibility, race/ethnicity, and English Language Learner status). For many of the survey items, there were few or no differences in level of agreement by student characteristics in spring 2016. However, several patterns of note emerged from the analysis. In both cohorts in spring 2016, ELL students were less likely than non-ELL students to agree that they: were really good at STEM, would be good at a job that uses STEM, and knew about many STEM jobs. In Cohort 1, students of color were less likely than white students to agree that they: would be good at a job that uses STEM, would like a job that uses STEM when they get older, and knew about many STEM jobs. These differences by ELL status and race/ethnicity in spring 2016 sometimes reflected baseline differences between the groups and sometimes were due to differences in the change that occurred in agreement with the items between the groups from baseline to spring 2016.

In Cohort 2, there were differences on a number of items between those eligible and ineligible for free/reduced-price lunch in spring 2016. Those eligible for free/reduced-price lunch were less likely than those ineligible to agree that they would be good at a job that uses STEM and that they knew about many STEM jobs. In addition, those eligible for free/reduced-price lunch were less likely than those ineligible to agree that: STEM knowledge is very important to their future, they notice STEM in the world around them, and they know about many out-of-school STEM-related activities. Finally, those eligible for free/reduced-price lunch were less likely than those ineligible to agree that they like learning engineering and that they think like an engineer to design solutions to problems. Despite these differences, Cohort 2 students eligible for free/reduced-price lunch increased their agreement with most of these items significantly from fall to spring of fourth grade. However, the increase in their agreement was either smaller than that of ineligible classmates, or they had lower agreement in the fall (baseline) than these classmates, or some of both.

Introduction

STEM Pathways aims to increase youths' long-term interest, learning and achievement in STEM through a deliberate and interconnected system of STEM learning opportunities. STEM Pathways is a partnership between five informal STEM organizations—The Bakken, Bell Museum of Natural History, Minnesota Zoo, STARBASE Minnesota, and The Works—and the Minneapolis Public Schools (MPS) and the Minnesota Department of Education (MDE), that tests a model for collaboration that could be expanded and replicated across more grade levels, schools, organizations and communities.

As part of the evaluation of the STEM Pathways program, students were given a survey measuring STEM awareness, attitudes, interests, and activities. The same survey items were administered to students on multiple occasions to assess any changes in their responses to them during their exposure to STEM Pathways programming.

Student survey results through spring of 2016 are reported for two cohorts of students attending the six STEM Pathways schools in Minneapolis Public Schools (MPS). The first cohort of students (Cohort 1) attended STEM Pathways schools for two years, 2014-15 as fourth graders and 2015-16 as fifth graders, experiencing two years of STEM Pathways programming. The student survey was administered to this cohort in fall 2014 (baseline assessment), and repeated in spring 2015 and spring 2016, providing the opportunity to examine potential changes in their survey responses over two school years. The second cohort (Cohort 2), who were fourth graders in the 2015-16 school year, experienced one year of STEM Pathways programming. They took the survey in the fall of 2015 (baseline assessment) and then again in the spring of 2016, providing the opportunity to examine potential changes in their survey responses from the beginning to the end of the 2015-16 school year. Changes found in students' survey responses over time may be associated with participation in STEM Pathways. However, caution is needed in attributing them solely to STEM Pathways because other STEM experiences students may have had in and out of school during the same period could have contributed to the changes as well.

The survey was administered to students as a group in their classrooms by Wilder Research staff in both fall (September) and spring (May-June) of the 2014-15 and 2015-16 school years. After a brief explanation of the survey, Wilder Research staff read the questions and students provided their answers on paper-and-pencil survey forms. A few students who were absent on the day the survey was administered completed it later. Students' parents or guardians were informed about the survey by letter and could have their child excluded from the survey if they wished by contacting the school.

Student survey results are reported for those who completed all or most of the survey each time it was administered to their class. For Cohort 1 (fifth graders in 2015-16), a total of 255 students completed all or most of the survey the three times it was administered over two school years. For Cohort 2 (fourth graders in 2015-16), a total of 345 students completed all or most of the survey in both the fall of 2015 and the spring of 2016. A total of 16 close-ended survey items were included at all the survey administration points. Results for these items are the subject of this report. The results are organized and reported in the following content areas (a couple of the items were included in two areas):

- Awareness and relevance of STEM
- STEM interest and confidence in STEM abilities
- Interest in STEM subjects
- Application of STEM to problem solving
- Careers using STEM

Results for Cohorts 1 and 2 are reported for each survey item at each assessment point. In addition, differences in results by student demographic characteristics (gender, free/ reduced-price lunch eligibility, race/ethnicity, and English Language Learner status) are described.

Results

Response options to the survey items were: don't agree, agree a little, mostly agree, agree a lot, and don't know. Those who agreed a lot or agreed mostly were considered to be in agreement with an item. Statistical tests (McNemar Test, two-sided) were conducted to determine whether change over time in the percentage of students responding "agree a lot" or "mostly agree" to each item was statistically significant ($p<.05$). When the terms "significant" and "not significant" are used in describing such changes in responses, these terms are referring to the results of the statistical tests. For Cohort 1, the significance of changes in responses was assessed over the first school year (fall 2014 to spring 2015), the second year (spring 2015 to spring 2016), and the full two school years (from fall 2014 to spring 2016). For Cohort 2 fourth graders, change was assessed over the 2015-16 school year, from fall 2015 to spring 2016. The changes occurring in Cohort 2 fourth graders' responses in 2015-16 were compared to those occurring for Cohort 1 students during their fourth grade year, 2014-15.

Differences in survey responses to each survey item were also examined by student demographic characteristics, included gender (male, female), free- or reduced-price lunch eligibility (eligible, ineligible), race/ethnicity (students of color, white), and ELL status (ELL, non-ELL). We tested for differences in the percentage of students who responded "agree a lot" or "mostly agree" to each survey item within the categories of each characteristic (female vs. male, eligible vs. ineligible for free/reduced-price lunch, etc.). In both Cohort 1 and Cohort 2, we tested for these differences in spring 2016 (using Fisher's Exact Test, two-sided).

In addition, we tested to determine in which student demographic groups changes in responses to each survey item occurred over time. That is, we examined changes among males, females, those eligible for free/reduced-price lunch, those ineligible for free/reduced-price lunch, students of color, white students, ELL students, and non-ELL students. For Cohort 1 these changes were examined for statistical significance (using the McNemar Test, two-sided) from fall 2014 to spring 2016, and for Cohort 2, from fall 2015 to spring 2016.

Only statistically significant differences ($p<.05$) are reported from the analyses of change by student characteristics.

Student demographic profiles

Demographic profiles of Cohort 1 and 2 students in fourth grade (who completed the survey in both the fall and spring of fourth grade) are presented in Figure 1. These profiles are shown side-by-side because we will be comparing the survey results of these two cohorts

in fourth grade. Note that the two profiles are very similar on the characteristics examined. In each cohort, the number of females and males is evenly divided, the distribution by race/ethnicity is very similar, those eligible for free/reduced-price lunch is just over three-quarters, those who are ELL is somewhat over one-third, and those receiving special education services is about one-tenth. The lack of differences in demographic characteristics suggests that any differences found in survey results between the two cohorts is unlikely to be due to differences on these characteristics.

1. Characteristics of fourth grade students who completed the student survey in both the fall and spring: 2015-16 and 2014-15 school years

		Fourth graders	
		Cohort 2 2015-16	Cohort 1 2014-15
Student characteristics		**(N=345)**	**(N=353)**
Gender	Female	50%	49%
	Male	50%	51%
Race/ethnicity	American Indian	2%	2%
	African American	34%	31%
	Asian	5%	7%
	Hispanic	33%	35%
	White	26%	25%
Free/reduced-price lunch	Eligible	77%	78%
	Not eligible	23%	22%
English Language Learner (ELL) status	ELL	36%	39%
	Not ELL	64%	61%
Special education	Yes	11%	9%
	No	89%	91%

Figure 2 shows the demographic profile of Cohort 1 students who completed the student survey all three times (fall 2014, spring 2015, and spring 2016). Note that the number of these students (255) is almost 100 fewer than the number who completed the fall 2014 and spring 2015 surveys in fourth grade (353, as shown in Figure 1). This smaller group of students from Cohort 1 are likely less mobile than the larger, original group of students since they completed the survey all three times, indicating that they continued to attend STEM Pathways schools over a two-year period. Compared to the fourth grade group in Figure 1, this smaller group is somewhat less likely to be African American, eligible for free/reduced-price lunch, and ELL.

2. Characteristics of fifth graders (Cohort 1) who complete the student survey in fall 2014, spring 2015, and spring 2016

Student characteristics		Cohort 1 (N=255)
Gender	Female	50%
	Male	50%
Race/ethnicity	American Indian	1%
	African American	24%
	Asian	8%
	Hispanic	38%
	White	28%
Free/reduced-price lunch	Eligible	71%
	Not eligible	29%
English Language Learner (ELL) status	ELL	33%
	Not ELL	67%
Special education	Yes	9%
	No	91%

Awareness and relevance of STEM

In this section, we present the results for four survey items related to awareness and relevance of STEM. For each item, we first examine changes in the percentage of students agreeing with the item from fall to spring in fourth grade – in 2015-16 for Cohort 2 and in 2014-15 for Cohort 1. Then, we examine change over two school years (fourth and fifth grades) for Cohort 1. Differences in results by student demographic characteristics are noted in fourth grade for Cohort 2 and over the two school years for Cohort 1.

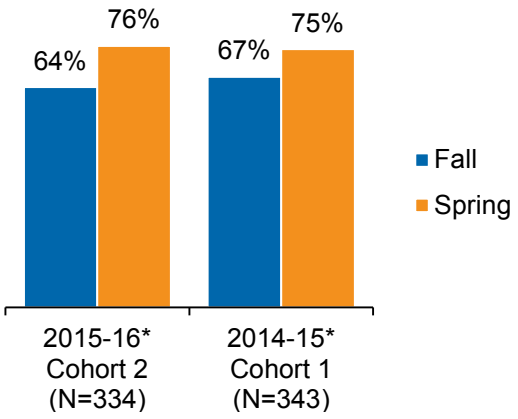
Importance of STEM knowledge

Agreement with the statement, "STEM knowledge is very important for my future," increased significantly from fall to spring in both Cohort 2 and Cohort 1 in fourth grade – by 12 and 8 percentage points respectively. In spring 2016 three-quarters of the students in both cohorts agreed with the statement (Figure 3). Significant increases in agreement occurred from fall to spring in 2015-16 in all demographic groups in Cohort 2. A significantly lower percentage of Cohort 2 students eligible for free/reduced price lunch agreed with the item in spring 2016 than those ineligible – 73% and 85%, respectively (Figure A2 in the Appendix). This difference was mainly due to a larger increase in agreement with the item from fall to spring among ineligible students than eligible students.

Changes in agreement with this item over two years in Cohort 1 are shown in Figure 4. Results indicate that agreement increased from 66 percent to 81 percent (15 percentage points) from fall 2014 to spring 2016. The increase in agreement was greater (and statistically significant) from fall 2014 to spring 2015 (11 percentage points) than from spring 2015 to spring 2016 (4 percentage points). All demographic groups except boys and those ineligible for free/reduced-price lunch had significant increases in agreement with the item over the two school years (Figure A4 in the Appendix).

3. Cohorts 2 and 1 in fourth grade: STEM knowledge is very important to my future

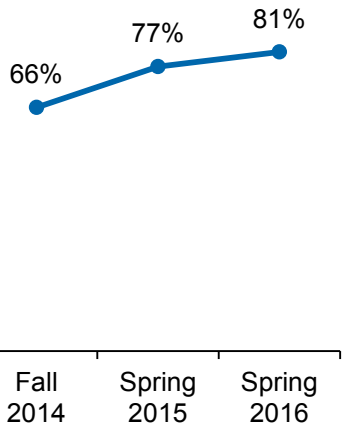
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

4. Cohort 1 in fourth and fifth grade: STEM knowledge is very important to my future [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2015, and from fall 2014 to spring 2016, are statistically significant (p<.05).

[a] Includes 246 students who responded to this item at all three time points.

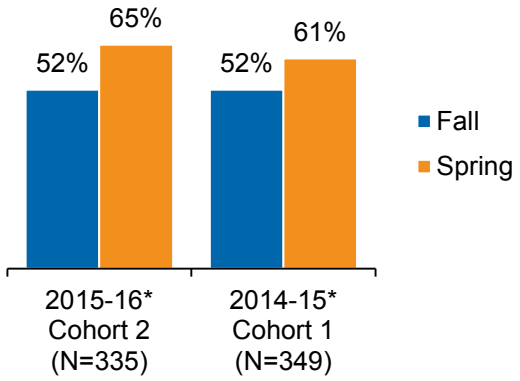
Notice STEM

The percentage of fourth graders who agreed with the statement, "I notice STEM in the world around me every day," increased significantly from fall to spring in both Cohort 2 and Cohort 1. Again, the increase was somewhat larger in Cohort 2 than Cohort 1 – 13 and 9 percentage points, respectively (Figure 5). Significant increases in agreement occurred in all Cohort 2 demographic groups except girls, whites, and ELL students. In spring 2016, a significantly lower percentage of Cohort 2 students eligible for free/reduced price lunch agreed with the item (62%) than those ineligible (78%). In addition, in spring 2016 a significantly lower percentage of Cohort 2 ELL students agreed with the item than non-ELL students – 55 and 71 percent, respectively (Figure A2). These differences in spring 2016 by free/reduced-price lunch eligibility and ELL status primarily reflected fall (baseline) differences in agreement with the item.

Agreement with this item increased significantly over two school years in Cohort 1, from 52 percent to 65 percent (Figure 6). Again, the increase was greater (and statistically significant) from fall 2014 to spring 2015 (9 percentage points) than from spring 2015 to spring 2016 (4 percentage points). Significant (or almost significant) increases in agreement with this item over the two school years occurred in all demographic groups except among white students and those ineligible for free/reduced-price lunch (Figure A4).

5. Cohorts 2 and 1 in fourth grade: I notice STEM in the world around me every day

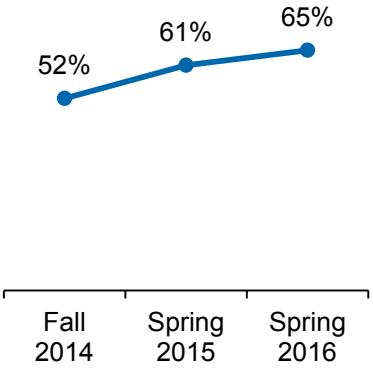
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

6. Cohort 1 in fourth and fifth grade: I notice STEM in the world around me every day [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2015, and from fall 2014 to spring 2016, are statistically significant ($p<.05$).

[a] Includes 252 students who responded to this item at all three time points.

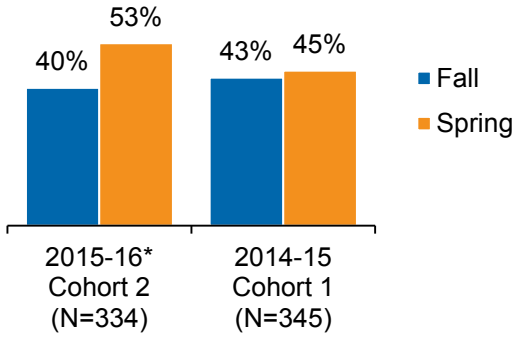
Know about STEM activities

Students' agreement with the statement, "I know about many STEM-related activities that happen outside of school," increased significantly among fourth graders in Cohort 2 in 2015-16 (by 13 percentage points) but not among fourth graders in Cohort 1 in 2014-15 (Figure 7). Significant increases in agreement occurred in all demographic groups in Cohort 2 except white students and ELL students. A significantly lower percentage of Cohort 2 students eligible for free/reduced price lunch agreed with the item in spring 2016 than those ineligible – 49 percent and 63 percent, respectively (Figure A2). This difference in spring 2016 by free/reduced-price lunch eligibility primarily reflected baseline differences in agreement with the item.

Agreement with this item increased significantly over two school years in Cohort 1 (from 40% to 55%), despite not increasing much the first year in fourth grade (Figure 8). With this item, a larger (and statistically significant) increase in agreement occurred from spring 2015 to spring 2016 (11 percentage points) than from fall 2014 to spring 2015 (4 percentage points). Significant increases in agreement with this item over the two school years occurred among girls, those eligible for free/reduced-price lunch, whites, and non-ELL students (Figure A4).

7. Cohorts 2 and 1 in fourth grade: I know about many STEM-related activities that happen outside of school

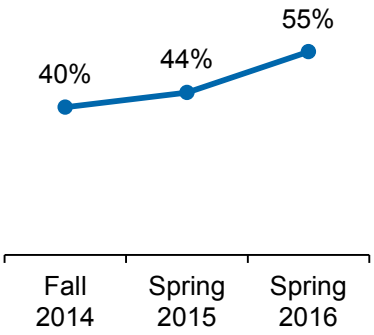
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

8. Cohort 1 in fourth and fifth grade: I know about many STEM-related activities that happen outside of school [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from spring 2015 to spring 2016, and from fall 2014 to spring 2016, are statistically significant (p<.05).

[a] Includes 250 students who responded to this item at all three time points.

Do STEM activities

Agreement with the statement, "I frequently do STEM-related activities outside of the school day," did not significantly change from fall to spring among fourth graders in Cohort 2 or Cohort 1. In the spring of their fourth grade year, 44 percent of Cohort 2 students and 40 percent of Cohort 1 students agreed with this item (Figure A1 in the Appendix).

After two school years there was no significant change in agreement with this item in Cohort 1. In spring 2016, 39 percent of Cohort 1 students agreed with the item (Figure A3 in the Appendix).

STEM interest and confidence in STEM abilities

In this section, we present the results for four survey items measuring interest and confidence in STEM as a whole. This is followed by a section on interest in each STEM subject.

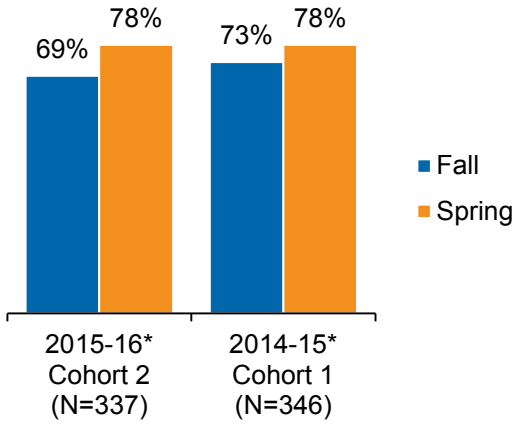
Like STEM

Agreement with the statement, "I like learning STEM," increased significantly from fall to spring in both Cohort 2 and Cohort 1. Again, the increase was somewhat larger in Cohort 2 than Cohort 1 (9 and 5 percentage points, respectively). In the spring of the fourth grade year, 78 percent of the students in both cohorts were in agreement with the item (Figure 9). In Cohort 2, significant increases in agreement with this item occurred in the following demographic groups: girls, those ineligible for free/reduced-price lunch, students of color, and ELL students (Figure A2).

After two school years in Cohort 1 there was no significant change in agreement with this item, although a relatively high percentage of the students liked learning STEM during this time period. In spring 2016, 79 percent of Cohort 1 students agreed with the item (Figure A3).

9. Cohorts 2 and 1 in fourth grade: I like learning STEM

Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

Would like to do more STEM

There was no significant change from fall to spring in the percentages of Cohort 2 and Cohort 1 fourth graders who agreed with the statement, "I would like to do more STEM-related activities." Two-thirds of the students in both cohorts agreed with the item in the spring of fourth grade (Figure A1).

After two school years there was no significant change in agreement with this item in Cohort 1. In spring 2016, 63 percent of Cohort 1 students agreed with the item (Figure A3).

Good at STEM

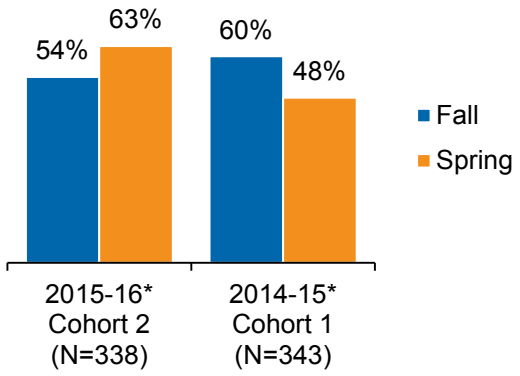
Among Cohort 2 fourth graders, agreement with the statement, "I'm really good at STEM," increased significantly from fall to spring (by 9 percentage points). In contrast, among Cohort 1 fourth graders, agreement with the statement decreased significantly from fall to spring – by 12 percentage points (Figure 10). In Cohort 2, significant increases in agreement with this item occurred in the following demographic groups: those ineligible for free/reduced-price lunch, whites, and non-ELL students. In spring 2016, a significantly higher percentage of Cohort 2 non-ELL students agreed with the item than ELL students – 68 and 54 percent, respectively (Figure A2). This difference by ELL status was primarily due to a larger increase in agreement with the item from fall to spring among non-ELL students than ELL students.

As indicated, Cohort 1 students had a significant decrease in agreement with being really good at STEM in fourth grade, but they significantly increased their agreement with the item in fifth grade. As a result, there was no significant difference in their agreement with the item at the beginning of fourth grade and the end of fifth grade. In spring 2016, 55 percent of all Cohort 1 students agreed that they were really good at STEM (Figure 11). The pattern of a decrease in agreement in fourth grade and an increase in fifth grade occurred among girls. Boys' agreement with the item stayed quite stable across the two years.

In spring 2016, non- ELL students were significantly more likely to agree they were really good at STEM than ELL students – 62 percent and 42 percent, respectively (Figure A4). This difference was mainly due to a decrease in agreement with the item among ELL students.

10. Cohorts 2 and 1 in fourth grade: I am really good at STEM

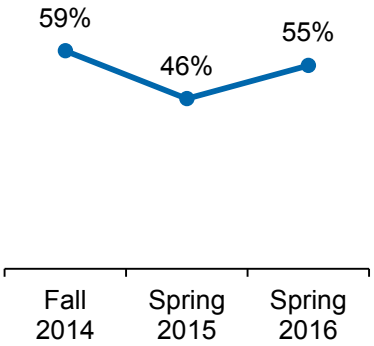
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

11. Cohort 1 in fourth and fifth grade: I am really good at STEM [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2015, and from spring 2015 to spring 2016, are statistically significant (p<.05).

[a] Includes 249 students who responded to this item at all three time points.

Good at STEM-related job

Agreement with the statement, "I would be good at a job that uses STEM," did not change significantly from fall to spring in fourth grade for either cohort. In the spring of fourth grade, somewhat over half of the students in Cohort 2 and Cohort 1 agreed with the item – 58% and 54%, respectively (Figure A1). In Cohort 2 in spring 2016, those ineligible for free/reduced-price were more likely to agree with the item than those eligible (68% vs. 54%), and non-ELL students were more likely to agree with the item than ELL students (62% vs. 50%) (Figure A2). The difference by free/reduced-price lunch eligibility was

primarily due to an increase in agreement with the item among the ineligible and no change among the eligible. The difference by ELL status reflected the baseline difference between the groups.

Agreement with the item did not change significantly over the two school years in Cohort 1. In spring of 2016, 53 percent agreed that they would be good at a job that uses STEM (Figure A3). Cohort 1 white students were more likely than students of color to agree with the item in spring 2016 (63% and 49%, respectively). This difference primarily reflected the baseline difference between the two groups. In addition, non-ELL students were more likely to agree with the statement than ELL students – 59 percent and 41 percent, respectively (Figure A4). This difference was mainly due to a decrease in agreement with the item among ELL students.

Interest in STEM subjects

This section presents results on students' interest in the four STEM subjects.

Like math

Agreement with the statement, "I like learning math," did not significantly change from fall to spring among fourth graders in Cohort 2 or Cohort 1. However, most students indicated that they liked learning math. Over 70 percent of the students in each cohort agreed with the statement in the fall and the spring of fourth grade (Figure A1). Although there wasn't an increase overall for Cohort 2, agreement with the item increased significantly among boys and ELL students (Figure A2).

After two school years there was still no significant change in agreement with this item in Cohort 1. In spring 2016, three-quarters of Cohort 1 students agreed that they liked learning math (Figure A3). At that time, students eligible for free/reduced-price lunch were significantly more likely to agree with the item than ineligible students – 80 percent and 63 percent, respectively (Figure A4). This difference was due to a decrease in agreement with the item among ineligible students and an increase in agreement among eligible students.

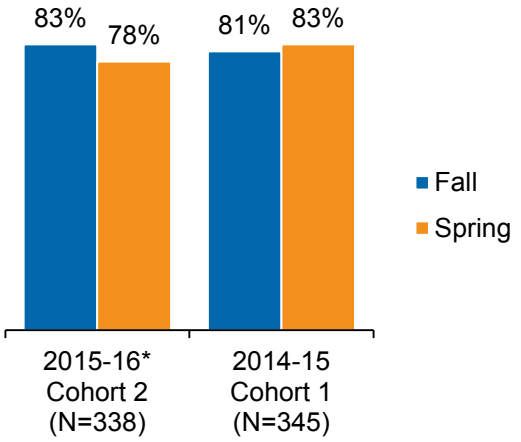
Like science

Among Cohort 2 fourth graders there was a small (5 percentage points), but statistically significant decrease in agreement with the statement, "I like learning science," from fall to spring. Nevertheless, in the spring a relatively high percentage of Cohort 2 fourth graders (78%) still agreed that they liked learning science (Figure 12). One Cohort 2 demographic group, non-ELL students, had a significant decrease in agreement from fall

to spring (Figure A2). Agreement with the item among Cohort 1 fourth graders did not change significantly (Figure 12).

12. Cohorts 2 and 1 in fourth grade: I like learning science

Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

A similar survey item was asked only of Cohort 2 fourth graders in both the fall and spring of the fourth grade year: "How much do you like studying science? (very little, some, quite a bit, or very much)." The percentage of students answering "quite a bit" or "very much" from fall to spring was compared. Similar to the results for the liking to learn science item, the percentage answering quite a bit/very much decreased significantly from fall to spring (from 83% to 77%). Again, only the non-ELL students had a significant decrease from fall to spring – from 81 percent to 73 percent answering quite a bit/very much.

No significant change in agreement with liking to learn science occurred over the two school years in Cohort 1. In spring 2016, 78 percent were in agreement with the item (Figure A3).

Like engineering

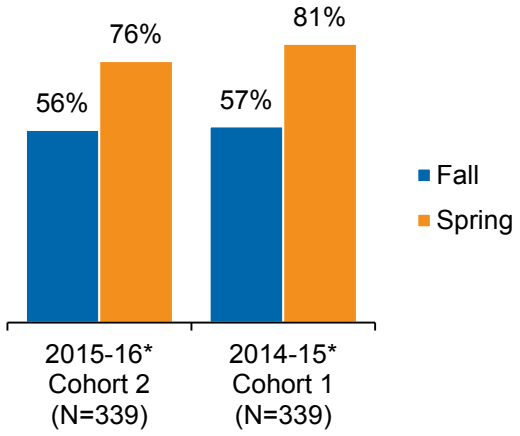
The percentage of fourth graders who agreed with the statement, "I like learning engineering," increased sharply and significantly from fall to spring in both Cohort 2 and Cohort 1 – by 20 and 24 percentage points, respectively (Figure 13). Among Cohort 2 fourth graders, this increase in agreement occurred in all demographic groups. In spring 2016, those Cohort 2 fourth graders eligible for free/reduced-price lunch were significantly less likely to agree they liked learning engineering than those ineligible – 72 percent and 88 percent, respectively (Figure A2). This difference was due to both the baseline

difference between the groups and a somewhat larger increase in agreement from fall to spring among ineligible students.

Agreement with this item increased significantly over two school years in Cohort 1, from 56 percent to 79 percent. However, the significant increase occurred in fourth grade with little change in the fifth grade (Figure 14). The significant increase in agreement occurred in all demographic groups (Figure A4).

13. Cohorts 2 and 1 in fourth grade: I like learning engineering

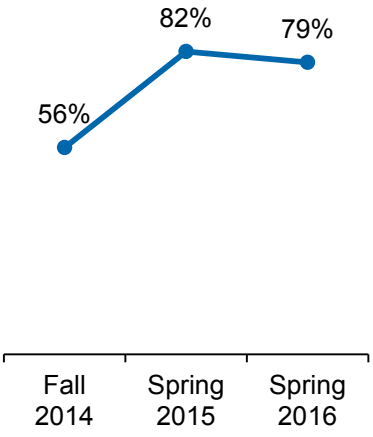
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

14. Cohort 1 in fourth and fifth grade: I like learning engineering [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2015, and from fall 2014 to spring 2016, are statistically significant (p<.05).

[a] Includes 244 students who responded to this item at all three time points.

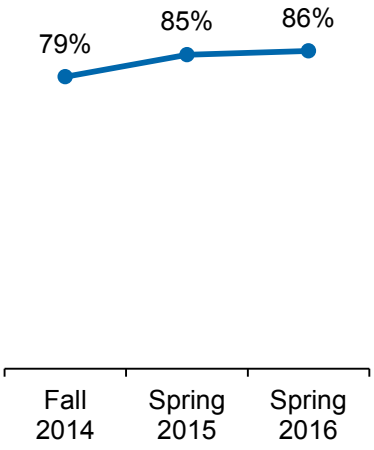
Like technology

Agreement with the statement, "I like learning technology," did not change significantly from fall to spring of fourth grade in either cohort. Agreement with the item was relatively high in both the fall and spring of fourth grade in each cohort, with agreement being 80 percent and 85 percent in the spring of 2016 in Cohort 2 and Cohort 1, respectively (Figure A1). In Cohort 2, those eligible for free/reduced-price lunch were less likely to agree with the item in spring 2016 than those ineligible – 78 percent and 88 percent, respectively (Figure A2). This difference was due to both the baseline difference between the groups and a somewhat larger increase in agreement from fall to spring among ineligible students.

A significant increase in agreement with the item occurred in Cohort 1 over the two school years. In spring 2016, 86 percent of Cohort 1 fifth graders agreed that they liked learning technology (Figure 15). A significant increase occurred in one demographic group, those eligible for free/reduced-price lunch (Figure A4).

15. Cohort 1 in fourth and fifth grade: I like learning technology [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2016 is statistically significant ($p<.05$).

[a] Includes 246 students who responded to this item at all three time points.

Application of STEM to problem solving

This section presents results for two survey items that measure students' application of technology and engineering to problem solving.

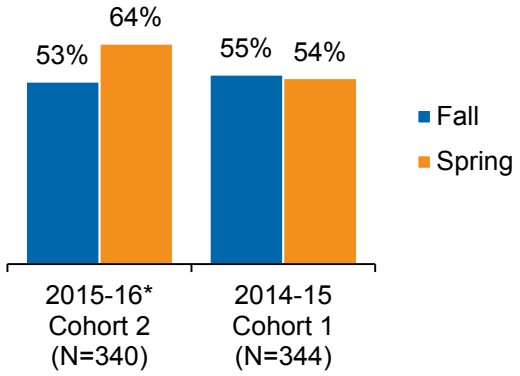
Use technology

Agreement with the statement, "I use technology to solve problems," increased significantly (by 11 percentage points) from fall to spring among Cohort 2 fourth graders (Figure 16). Agreement increased in all Cohort 2 demographic groups except among boys and white students (Figure A2). In contrast, there was almost no change in agreement with the item from fall to spring among Cohort 1 fourth graders (Figure 16).

No significant change in agreement with the item occurred in Cohort 1 over the two school years. At the end of the two years in spring 2016, 60 percent of Cohort 1 fifth graders agreed that they used technology to solve problems (Figure A3).

16. Cohorts 2 and 1 in fourth grade: I use technology to solve problems

Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

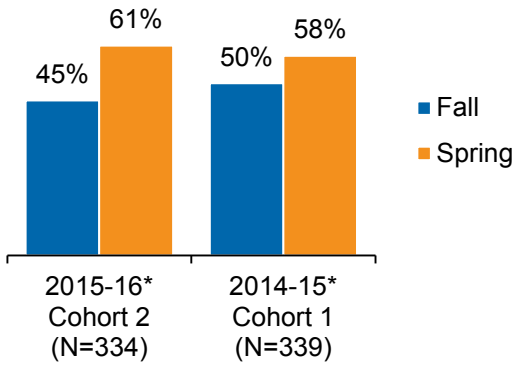
Think like an engineer

Agreement with the statement, "I think like an engineer to design solutions to problems," increased significantly from fall to spring of fourth grade in Cohort 2 and Cohort 1, with Cohort 2 having a larger increase – 16 percentage points vs. 8 percentage points (Figure 17). Agreement with the item increased in all Cohort 2 demographic groups. In spring 2016, those ineligible for free/reduced-price lunch were more likely to agree with the item than those who were eligible – 77 percent and 56 percent, respectively (Figure A2). This difference was due to both the baseline difference between the groups and a larger increase in agreement from fall to spring among ineligible students.

In Cohort 1, agreement with the item increased significantly over the two school years (by 9 percentage points), with most of the increase occurring in the first year (Figure 18).

17. Cohorts 2 and 1 in fourth grade: I think like an engineer to design solutions to problems

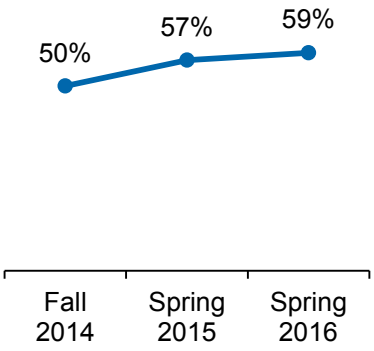
Percentage of students who "agree a lot" or "mostly agree"



*The change in agreement with the item from fall to spring is statistically significant (p<.05).

18. Cohort 1 in fourth and fifth grade: I think like an engineer to design solutions to problems [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2016 is statistically significant (p<.05).

[a] Includes 246 students who responded to this item at all three time points.

Careers using STEM

This section includes four survey items related to careers in STEM. Two of the items were also included in other sections, and consequently, results for these items have already been discussed.

Importance of STEM knowledge

Results for the survey item, "STEM knowledge is very important for my future," were presented earlier in the Awareness and Relevance of STEM section above. Briefly, agreement with the statement increased significantly from fall to spring in both Cohort 2 and Cohort 1 in fourth grade – by 12 and 8 percentage points respectively. In spring 2016, three-quarters of the students in both cohorts agreed with the statement (Figure 3).

Over two school years, there was a statistically significant 15 percentage point increase in agreement with the item in Cohort 1. Agreement rose from 66 percent in fall 2014 to 81 percent in spring 2016 (Figure 4).

Know about STEM-related jobs

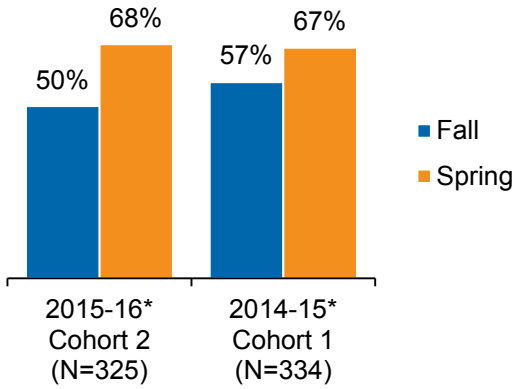
Agreement with the statement, "I know about many jobs that use STEM," increased significantly from fall to spring in fourth grade for both Cohort 2 and Cohort 1 (by 18 percentage points and 10 percentage points, respectively). Two-thirds of fourth graders in each cohort agreed with the statement in spring 2016 (Figure 19). For Cohort 2, increases in agreement with the item occurred in all demographic groups except white students. In spring 2016, Cohort 2 students ineligible for free/reduced-price lunch were more likely to agree with the item than those eligible (83% and 64%, respectively). In addition, non-ELL students were more likely to agree with the item than ELL students – 72 percent and 61 percent, respectively (Figure A2). The differences in agreement with the item by free/reduced-price lunch eligibility and ELL status mainly reflected baseline differences in both cases. The difference increased somewhat from fall to spring between the free/reduced-price lunch eligibility groups and decreased between the ELL status groups.

Cohort 1 students' agreement that they knew about many jobs using STEM increased significantly over the two school years. About three-quarters of Cohort 1 students agreed with the item by the end of fifth grade in spring 2016 (Figure 20). Agreement increased significantly over the two school years in all demographic groups except among boys and ELL students. In spring 2016, Cohort 1 white students were more likely to agree with the item than students of color (86% and 69%, respectively). This difference was similar to the baseline difference between the two groups. Also, non-ELL students were more likely to agree with the item than ELL students – 79 percent and 64 percent, respectively

(Figure A4.). This difference was due to both a baseline difference and a difference in the increase in agreement with the item between the two groups.

19. Cohorts 2 and 1 in fourth grade: I know about many jobs that use STEM

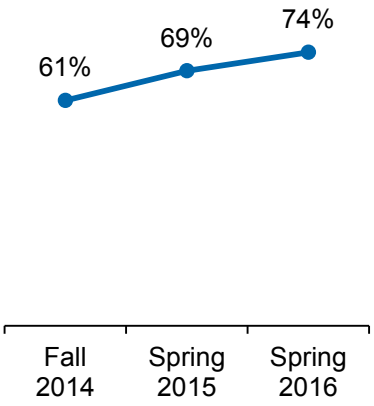
Percentage of students who "agree a lot" or "mostly agree"



* The change in agreement with the item from fall to spring is statistically significant (p<.05).

20. Cohort 1 in fourth and fifth grade: I know about many jobs that use STEM [a]

Percentage of students who "agree a lot" or "mostly agree"



Note: The change in agreement with the item from fall 2014 to spring 2016 is statistically significant (p<.05).

[a] Includes 237 students who responded to this item at all three time points.

Good at STEM-related job

Results for the item, "I would be good at a job that uses STEM," were presented earlier in the STEM Interest and Confidence in STEM Abilities section. Briefly, agreement with the item did not change significantly from fall to spring in fourth grade for either cohort.

In the spring of fourth grade, somewhat over half of the students in Cohort 2 and Cohort 1 agreed with the item – 58% and 54%, respectively (Figure A1).

Similarly, agreement with the item did not change significantly over the two school years in Cohort 1. In spring of 2016, 53 percent agreed that they would be good at a job that uses STEM (Figure A3).

Like to have STEM-related job

No significant change in agreement with the statement, "When I get older, I would like to have a job that uses STEM," occurred from fall to spring of fourth grade in either Cohort 2 or Cohort 1. Slightly over half of the students in each cohort agreed with the item in the spring of fourth grade (Figure A1).

Similarly, no significant change occurred in agreement with the item over two school years in Cohort 1, with 57 percent agreeing with the item by the end of fifth grade in spring 2016 (Figure A3). Although there was no significant increase overall, significant increases in agreement with the item did occur in three demographic groups: whites, non-ELL students, and those ineligible for free/reduced-price lunch. In spring 2016, white students were more likely to agree with the item than students of color – 69 percent and 52 percent, respectively (Figure A4). This difference was mainly due to little change in agreement with the item among students of color and a large increase among white students.

Appendix

A1. STEM Pathways Student Survey: Fourth graders (Cohort 2 in 2015-16 and Cohort 1 in 2014-15)

			Percentage of students answering "agree a lot or mostly agree" [a]		
Item	**School year**	**Number**	**Fall**	**Spring**	**Signif. Test**
STEM awareness and relevance					
STEM knowledge is very important to my future.	2015-16	334	64%	76%	*
	2014-15	343	67%	75%	*
I notice STEM in the world around me every day.	2015-16	335	52%	65%	*
	2014-15	349	52%	61%	*
I know about many STEM-related activities that happen outside of school.	2015-16	334	40%	53%	*
	2014-15	345	43%	45%	
I frequently do STEM-related activities outside of school.	2015-16	337	47%	44%	
	2014-15	347	41%	40%	
STEM interest and confidence					
I like learning STEM.	2015-16	337	69%	78%	*
	2014-15	346	73%	78%	*
I would like to do more STEM-related activities.	2015-16	335	62%	67%	
	2014-15	348	67%	68%	
I am really good at STEM.	2015-16	338	54%	63%	*
	2014-15	343	60%	48%	*
I would be good at a job that uses STEM.	2015-16	335	55%	58%	
	2014-15	340	54%	54%	
Interest in STEM subjects					
I like learning math.	2015-16	336	72%	77%	
	2014-15	344	72%	74%	
I like learning science.	2015-16	338	83%	78%	*
	2014-15	345	81%	83%	
I like learning engineering.	2015-16	339	56%	76%	*
	2014-15	339	57%	81%	*
I like learning technology.	2015-16	336	76%	80%	
	2014-15	344	79%	85%	
How much do you like studying science? (percentage answering "quite a bit" or "very much" [b]	2015-16	333	83%	77%	*

A1. STEM Pathways Student Survey: Fourth graders (Cohort 2 in 2015-16 and Cohort 1 in 2014-15) (continued)

Percentage of students answering "agree a lot or mostly agree" [a]

Item	School year	Number	Fall	Spring	Signif. Test
Application of STEM to problem-solving					
I use technology to solve problems.	2015-16	340	53%	64%	*
	2014-15	344	55%	54%	
I think like an engineer to design solutions to problems.	2015-16	334	45%	61%	*
	2014-15	339	50%	58%	*
Careers using STEM					
STEM knowledge is very important to my future.	2015-16	334	64%	76%	*
	2014-15	343	67%	75%	*
I know about many jobs that use STEM.	2015-16	325	50%	68%	*
	2014-15	334	57%	67%	*
I would be good at a job that uses STEM.	2015-16	335	55%	58%	
	2014-15	340	54%	54%	
When I get older, I would like to have a job that uses STEM.	2015-16	333	50%	55%	
	2014-15	343	55%	53%	

[a] Response options for the survey items are: don't agree, agree a little, mostly agree, agree a lot, and don't know.

[b] Response options for the survey items are: very little, some, quite a bit, and very much, quite a bit.

* Statistically significant ($p<.05$) using the McNemar Test, two-sided.

A2. STEM Pathways student survey fourth grade (Cohort 2) results by student characteristics, 2015-16: Statistically significant results (p<.05) by survey item

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2015	Spring 2016
STEM knowledge is very important to my future.							
Gender					Female (n=166)	64%	74%
					Male (n=168)	63%	78%
Free/reduced-price lunch	Eligible (n=255)	73%	Ineligible (n=79)	85%	Eligible (n=255)	63%	73%
					Ineligible (n=79)	66%	85%
Race/ethnicity					Of color (n=247)	63%	75%
					White (N=87)	67%	79%
ELL status					ELL (n=121)	58%	73%
					Non-ELL (n=213)	67%	78%
I notice STEM in the world around me every day.							
Gender					Male (n=166)	50%	68%
Free/reduced-price lunch	Eligible (n=255)	62%	Ineligible (n=80)	78%	Eligible (n=255)	49%	62%
					Ineligible (n=80)	61%	78%
Race/ethnicity					Of color (n=247)	51%	65%
ELL status	ELL (n=122)	55%	Non-ELL (n=213)	71%	Non-ELL (n=213)	56%	71%
I know about many STEM-related activities that happen outside of school.							
Gender					Female (n=166)	36%	51%
					Male (n=168)	43%	54%
Free/reduced-price lunch	Eligible (n=255)	49%	Ineligible (n=79)	63%	Eligible (n=255)	37%	49%
					Ineligible (n=79)	47%	63%
Race/ethnicity					Of color (n=246)	37%	51%
ELL status					Non-ELL (n=212)	42%	56%

A2. STEM Pathways student survey fourth grade (Cohort 2) results by student characteristics, 2015-16: Statistically significant results (p<.05) by survey item (continued)

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2015	Spring 2016
I like learning STEM.							
Gender					Female (n=169)	70%	80%
Free/reduced-price lunch					Ineligible (n=80)	68%	84%
Race/ethnicity					Of color (n=249)	68%	78%
ELL status					ELL (n=123)	63%	78%
I am really good at STEM.							
Free/reduced-price lunch					Ineligible (n=79)	49%	72%
Race/ethnicity					White (n=88)	56%	69%
ELL status	ELL (n=122)	54%	Non-ELL (n=216)	68%	Non-ELL (n=216)	56%	68%
I would be good at a job that uses STEM.							
Free/reduced-price lunch	Eligible (n=256)	54%	Ineligible (n=79)	68%			
ELL status	ELL (n=122)	50%	Non-ELL (n=213)	62%			
I like learning math.							
Gender					Male (n=170)	65%	75%
ELL status					ELL (n=124)	69%	80%
I like learning science.							
ELL status					Non-ELL (n=214)	85%	78%
I like learning engineering.							
Gender					Female (n=168)	54%	73%
					Male (n=171)	58%	78%
Free/reduced-price lunch	Eligible (n=259)	72%	Ineligible (n=80)	88%	Eligible (n=259)	54%	72%
					Ineligible (n=80)	65%	88%
Race/ethnicity					Of color (n=251)	53%	73%
					White (n=88)	65%	82%
ELL status					ELL (n=123)	47%	70%
					Non-ELL (n=216)	62%	79%

A2. STEM Pathways student survey fourth grade (Cohort 2) results by student characteristics, 2015-16: Statistically significant results (p<.05) by survey item (continued)

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2015	Spring 2016
I like learning technology.							
Free/reduced-price lunch	Eligible (n=258)	78%	Ineligible (n=78)	88%			
I use technology to solve problems.							
Gender					Female (n=170)	47%	63%
Free/reduced-price lunch					Eligible (n=260)	54%	64%
					Ineligible (n=80)	49%	65%
Race/ethnicity					Of color (n=252)	52%	64%
ELL status					ELL (n=124)	51%	65%
					Non-ELL (n=216)	54%	64%
I think like an engineer to design solutions to problems.							
Gender					Female (n=168)	43%	58%
					Male (n=166)	47%	64%
Free/reduced-price lunch	Eligible (n=256)	56%	Ineligible (n=78)	77%	Eligible (n=256)	43%	56%
					Ineligible (n=78)	51%	77%
Race/ethnicity					Of color (n=246)	46%	59%
					White (n=88)	42%	65%
ELL status					Ell (n=122)	43%	57%
					Non-ELL (n=212)	46%	63%
I know about many jobs that use STEM.							
Gender					Female (n=163)	50%	64%
					Male (n=162)	51%	73%
Free/reduced-price lunch	Eligible (n=245)	64%	Ineligible (n=80)	83%	Eligible (n=245)	47%	64%
					Ineligible (n=80)	61%	83%
Race/ethnicity					Of color (n=237)	45%	66%
ELL status	ELL (n=116)	61%	Non-ELL (n=209)	72%	ELL (n=116)	38%	61%
					Non-ELL (n=209)	57%	72%

A2. STEM Pathways student survey fourth grade (Cohort 2) results by student characteristics, 2015-16: Statistically significant results (p<.05) by survey item (continued)

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2015	Spring 2016
How much do you like studying science? Percent responding quite a bit/very much: [d]							
ELL status	ELL (n=121)	84%	Non-ELL (n=212)	73%	Non-ELL (n=212)	81%	73%

[a] Response options for the survey items are: don't agree, agree a little, mostly agree, agree a lot, and don't know.

[b] Statistically significant difference (p<.05) using Fisher's Exact Test, two-sided.

[c] Statistically significant change (p<.05) using McNemar Test, two-sided.

[d] Response options for the survey items are: very little, some, quite a bit, and very much, quite a bit.

A3. STEM Pathways Student Survey: Cohort 1, fourth and fifth grades

Item	Number	Percentage of students answering "agree a lot or mostly agree" [a] 1. Fall 2014	Signif. test 1 vs. 2	2. Spring 2015	Signif. test 2 vs. 3	30 Spring 2016	Signif. test 1 vs. 3
STEM awareness and relevance							
STEM knowledge is very important to my future.	246	66%	*	77%		81%	*
I notice STEM in the world around me every day.	252	52%	*	61%		65%	*
I know about many STEM-related activities that happen outside of school.	250	40%		44%	*	55%	*
I frequently do STEM-related activities outside of school.	252	40%		41%		39%	
STEM interest and confidence.							
I like learning STEM.	252	75%		77%		79%	
I would like to do more STEM-related activities.	251	68%		67%		63%	
I am really good at STEM.	249	59%	*	46%	*	55%	
I would be good at a job that uses STEM.	246	54%		53%		53%	

A3. STEM Pathways Student Survey: Cohort 1, fourth and fifth grades (continued)

Item	Number	Percentage of students answering "agree a lot or mostly agree" [a] 1. Fall 2014	Signif. test 1 vs. 2	2. Spring 2015	Signif. test 2 vs. 3	30 Spring 2016	Signif. test 1 vs. 3
Interest in STEM subjects							
I like learning math.	249	73%		75%		75%	
I like learning science.	251	80%		82%		78%	
I like learning engineering.	244	56%	*	82%		79%	*
I like learning technology.	246	79%		85%		86%	*
Application of STEM to problem-solving							
I use technology to solve problems.	249	56%		53%		60%	
I think like an engineer to design solutions to problems.	246	50%		57%		59%	*
Careers using STEM							
STEM knowledge is very important to my future.	246	66%	*	77%		81%	*
I know about many jobs that use STEM.	237	61%		69%		74%	*
I would be good at a job that uses STEM.	246	54%		53%		53%	
When I get older, I would like to have a job that uses STEM.	247	53%		53%		57%	

[a] Response options for the survey items are: don't agree, agree a little, mostly agree, agree a lot, and don't know.

*Statistically significant ($p<.05$) using McNemar Test, two-sided.

A4. STEM Pathways student survey Cohort 1 results by student characteristics, Fall 2014 to Spring 2016: Statistically significant results (p<.05) by survey item

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2014	Spring 2016
STEM knowledge is very important to my future.							
Gender					Female (n=124)	62%	83%
Free/reduced-price lunch					Eligible (n=177)	63%	82%
Race/ethnicity					Of color (n=179)	67%	80%
					White (N=67)	63%	84%
ELL status					ELL (n=81)	59%	77%
					Non-ELL (n=165)	69%	83%
I notice STEM in the world around me every day.							
Gender					Female (n=126)	52%	65%
					Male (n=126)	52%	65%
Free/reduced-price lunch					Eligible (n=180)	51%	64%
Race/ethnicity					Of color (n=181)	52%	67%
ELL status					ELL (n=82) p=.05	48%	61%
					Non-ELL (n=170)	54%	67%
I know about many STEM-related activities that happen outside of school.							
Gender					Female (n=124)	34%	54%
Free/reduced-price lunch					Eligible (n=178)	40%	55%
Race/ethnicity					White (n=70)	33%	60%
ELL status					Non-ELL (n=167)	40%	59%
I am really good at STEM.							
ELL status	ELL (n=83)	42%	Non-ELL (n=166)	62%			
I would be good at a job that uses STEM.							
Race/ethnicity	Of color (n=175)	49%	White (n=71)	63%			
ELL status	ELL (n=81)	41%	Non-ELL (n=165)	59%			
I like learning math.							
Free/reduced-price lunch	Eligible (n=176)	80%	Ineligible (n=73)	63%			

A4. STEM Pathways student survey Cohort 1 results by student characteristics, Fall 2014 to Spring 2016: Statistically significant results (p<.05) by survey item (continued)

Student characteristics	Significant difference between groups in percentage who "agree a lot" or "mostly agree" with survey item in Spring 2016 [a,b]				Significant change within group in percentage who "agree a lot" or "mostly agree" with survey item [a,c]		
					Group	Fall 2014	Spring 2016
I like learning engineering.							
Gender					Female (n=123)	46%	75%
					Male (n=121)	66%	83%
Free/reduced-price lunch					Eligible (n=172)	55%	79%
					Ineligible (n=72)	57%	78%
Race/ethnicity					Of color (n=176)	57%	78%
					White (n=68)	53%	79%
ELL status					ELL (n=79)	48%	78%
					Non-ELL (n=165)	59%	79%
I like learning technology.							
Free/reduced-price lunch					Eligible (n=174)	79%	87%
I know about many jobs that use STEM.							
Gender					Female (n=122)	55%	73%
Free/reduced-price lunch					Eligible (n=166)	59%	72%
					Ineligible (n=71)	66%	79%
Race/ethnicity	Of color (n=167)	69%	White (n=70)	86%	Of color (n=167)	57%	69%
					White (n=70)	70%	86%
ELL status	ELL (n=76)	64%	Non-ELL (n=161)	79%	Non-ELL (n=161)	64%	79%
When I get older, I would like to have a job that uses STEM.							
Free/reduced-price lunch					Ineligible (n=72)	49%	65%
Race/ethnicity	Of color (n=176)	52%	White (n=71)	69%	White (n=71)	49%	69%
ELL status					Non-ELL (n=166)	50%	61%

[a] Response options for the survey items are: don't agree, agree a little, mostly agree, agree a lot, and don't know.

[b] Statistically significant difference (p<.05) using Fisher's Exact Test, two-sided.

[c] Statistically significant change (p<.05) using McNemar Test, two-sided.