



STEM Pathways Student Survey Results for the 2014-15 School Year

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. In fall 2014 and spring 2015, a survey was administered to fourth- and fifth-grade students at the six STEM Pathways schools in Minneapolis Public Schools (MPS). Most of the survey items were the same in the fall and spring, permitting analysis of changes in students' responses to the items from the beginning to the end of the 2014-15 school year. The survey assessed students' STEM awareness, attitudes, interests, and activities. Changes in students' responses in these areas from fall to spring may be associated with participation in STEM Pathways. However, caution is needed in attributing them 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.

Of 829 eligible fourth and fifth graders from the six STEM Pathways schools, 705 completed all or most of the survey in both the fall and spring for a response rate of 85 percent. Of the 705, 353 were fourth graders and 352 were fifth graders. Results for the 16 close-ended survey items included in both the fall and spring surveys are the subject of this report and are summarized below. The closed-ended items were a series of statements with the response options: agree a lot, mostly agree, agree a little, don't agree, and don't know. Those who agreed a lot or agreed mostly were considered to be in agreement with an item.

Differences in survey results were examined by grade and by student demographic characteristics: gender, eligibility for free- or reduced-price lunch (an indicator of students' family income), English Language Learner (ELL) status, and race/ethnicity (white students, students of color).

Promising results

STEM interest and application

Interest in engineering (“I like learning engineering”) increased overall from fall to spring (agreement with the statement increased from 62% to 77%). This increase occurred primarily among fourth graders (agreement increased from 57% to 81%). The increase appeared to be due to increased knowledge or understanding of what engineering is as “don’t know” responses from fourth graders went down sharply from fall to spring while “agree a lot” responses went up very strongly. Perhaps related to this, agreement with the statement, “I think like an engineer to design solutions to problems,” increased among fourth graders from fall to spring (from 50% to 58%). Boys showed more interest in engineering than girls, but the interest of both groups increased from fall to spring. The interest in engineering of all other demographic groups examined increased from fall to spring as well.

Interest in STEM as a whole (“I like learning STEM”) increased among fourth graders from fall to spring (agreement with the statement increased from 73% to 78%). This increase occurred especially among boys and ELL students.

Overall, interest in other STEM subjects (math, science, and technology) did not change significantly from fall to spring. These results might still be viewed as favorable because over three-quarters of the students already liked learning these subjects at the time of the baseline survey in the fall. Despite the lack of change overall, interest in both science and technology increased among boys from fall to spring.

STEM relevance and awareness

Students’ agreement that STEM knowledge is important to their futures increased from fall to spring (from 68% to 77% in agreement). This increase occurred across grades and across almost all student demographic groups examined.

Overall, students’ awareness of STEM (“I notice STEM in the world around me every day”) also increased from fall to spring (i.e., from 54% to 59% agreeing with the statement). This increase primarily occurred among fourth graders (from 52% to 61% agreeing with the statement) and among students of color.

Knowledge of STEM careers

Knowledge of STEM jobs (“I know about many jobs that use STEM”) increased from fall to spring in both fourth and fifth grades (overall, from 59% to 68% agreeing with the statement). This increase occurred in most of the student demographic groups examined.

Challenges and possible opportunities for growth

Confidence in STEM abilities

Confidence in STEM abilities (“I am really good at STEM”) decreased from fall to spring (from 58% to 49% agreeing with the statement). Fourth graders had a bigger decrease than fifth graders, with more fourth graders being less sure of their STEM abilities in the spring (i.e., more responding “don’t know” to the survey item). Student demographic groups with decreases in their STEM confidence levels were girls, lower-income students, ELL and non-ELL students, and students of color.

Despite the decrease in agreement with the statement, “I am really good at STEM,” agreement with the statement, “I would be good at a job that uses STEM,” did not change significantly from fall to spring (slightly over 50% agreed at both time points). Females, low-income, students, and students of color tended to be less confident that they would be good at a STEM-related job compared to their demographic counterparts.

Participation in STEM activities outside of school

The proportion of students engaging in frequent STEM-related activities outside of school did not change significantly from fall to spring in either fourth or fifth grade. Overall, 39 percent of the students agreed that they frequently did STEM-related activities outside of school in the fall and 36 percent agreed they frequently did such activities in the spring. The proportion of ELL students participating frequently in such activities declined from fall to spring (from 45% to 32%).

Slightly fewer than half of the students in both the fall and spring agreed that they knew about many STEM-related activities outside of school. The only demographic group to have an increase in agreement with this item from fall to spring was white students.

Over 60 percent of the students in both fall and spring agreed that they would like to do more STEM-related activities.

Application of technology

Applying technology to problem-solving (“I use technology to solve problems”) did not change from fall to spring with 56 percent of all the students agreeing with this item at both time points.

Interest in STEM careers

There was little change from fall to spring in students’ interest in having a job that uses STEM when they are older, with slightly over half agreeing with this item at both time points. Higher income students were more likely to have an interest in such a job.

Introduction

STEM Pathways aims to increase youths' long-term interest, learning, and achievement in STEM through a deliberate, interconnected, and comprehensive system of STEM learning opportunities. In fall 2014 and spring 2015, a survey was administered to fourth- and fifth-grade students at the six STEM Pathways schools in Minneapolis Public Schools (MPS). Most of the survey items were the same in the fall and spring, permitting analysis of changes in students' responses to the items from the beginning to the end of the 2014-15 school year. The survey assessed students' STEM awareness, attitudes, interests, and activities. Changes in students' responses in these areas from fall to spring may be associated with participation in STEM Pathways. However, caution is needed in attributing them 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 2014) and spring (May-June 2015). 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 students who completed all or most of the survey in fall and spring in the STEM Pathways schools. Of 829 eligible fourth and fifth graders from the six STEM Pathways schools, 705 completed all or most of the survey in both the fall and spring for a response rate of 85 percent. A total of 16 close-ended survey items were included in both the fall and spring. Results for these items are the subject of this report. Results for these items are organized and reported in the following content areas (a couple of the items were included in two areas):

- STEM interest and confidence in STEM abilities
- Opportunities for improvement in students' STEM learning: Awareness and relevance of STEM
- Application of STEM to problem solving
- Careers using STEM
- Interest in STEM subjects

Results are reported in two sections. In the first section overall results, and results for fourth and fifth graders separately, are reported. In the second section, results are reported by student characteristics (gender, free/reduced-price lunch eligibility, race/ethnicity, and English Language Learner status).

Overall results and results by grade

Of the 705 students who completed all or most of the survey in both the fall and spring, 353 were fourth graders and 352 were fifth graders. Response options to the survey items were: agree a lot, mostly agree, agree a little, don't agree, 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 from fall to spring 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.

STEM interest and confidence in STEM abilities

Overall results for the four survey items in this section are provided in Figure 1. Results for these items are provided separately for fourth graders and fifth graders in Figures 2 and 3, respectively.

Like STEM. Overall, there was no significant difference from fall to spring in the percentage of students who agreed a lot or mostly agreed with the statement, "I like learning STEM." However, among fourth graders there was a significant increase in those who agreed a lot/mostly agreed with the statement from fall to spring (from 73% to 78%). The increase in agreed a lot/mostly agreed responses was accompanied by a similar-sized decrease in "don't know" responses. There was no significant difference in fifth graders who agreed a lot/mostly agreed with the statement between fall and spring.

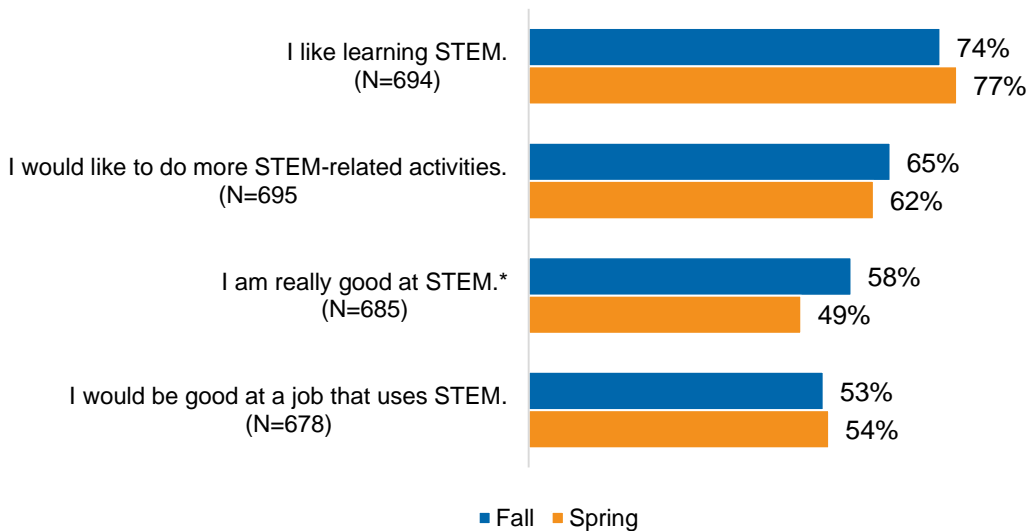
Would like to do more STEM. Overall, there was no significant difference in the fall and spring percentages of students who agreed with the statement, "I would like to do more STEM-related activities." Among fourth graders, the percentages who agreed were almost the same in fall and spring. For fifth graders, the percentage who agreed from fall to spring decreased but the difference was not significant.

Good at STEM. Overall, there was a significant decrease from fall to spring in students who agreed with the statement, "I'm really good at STEM" (from 58% to 49%). This pattern was stronger (significant) among fourth graders and weaker (not significant) among fifth graders. Fourth graders had a 12 percentage-point drop in agreement with the statement due to more students responding "don't know" to the statement in the spring (12 percentage-point increase).

Good at STEM-related job. There was little difference from fall to spring overall, or within fourth or fifth grade, in the percentages who agreed with the statement, "I would be good at a job that uses STEM."

1. STEM interest and confidence: Overall results

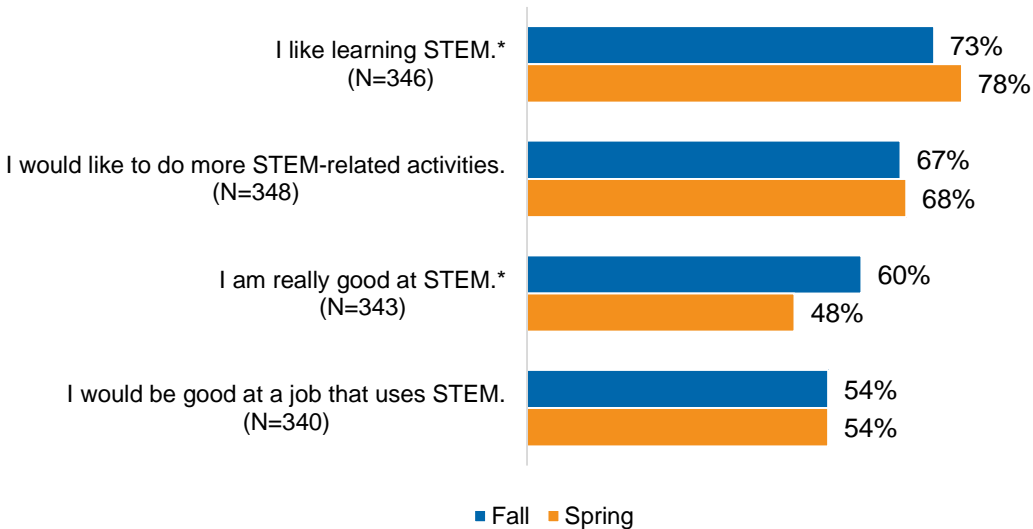
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



*The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).

2. STEM interest and confidence: Fourth grade results

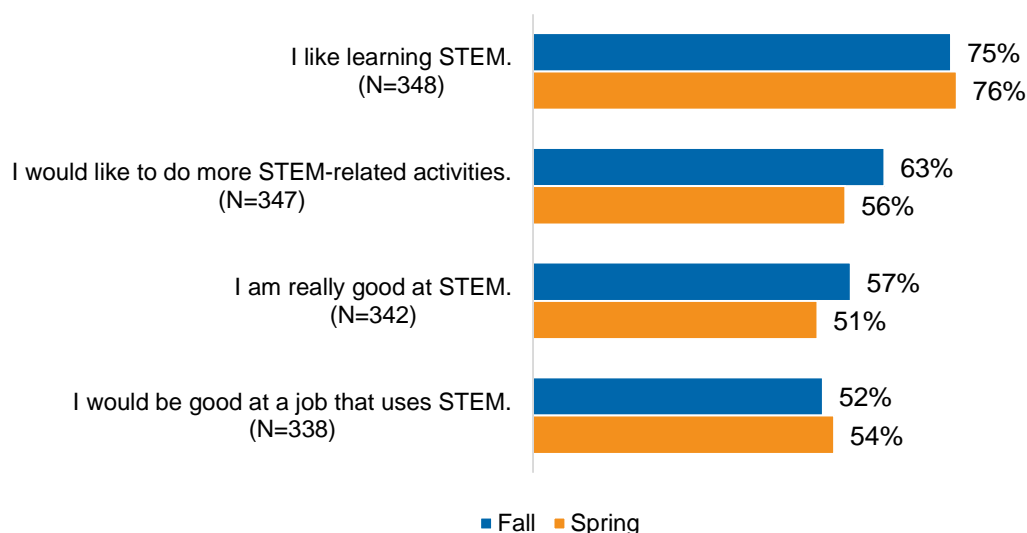
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



*The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).

3. STEM interest and confidence: Fifth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



Opportunities for improvement in students' STEM learning: Awareness and relevance of STEM

Overall results for the four survey items in this section are provided in Figure 4. Results for these items are provided separately for fourth graders and fifth graders in Figures 5 and 6, respectively.

Importance of STEM knowledge. Agreement with the statement, “STEM knowledge is very important for my future,” increased significantly from fall to spring overall, and in fourth and fifth grades. This increase occurred in the “agree a lot” category.

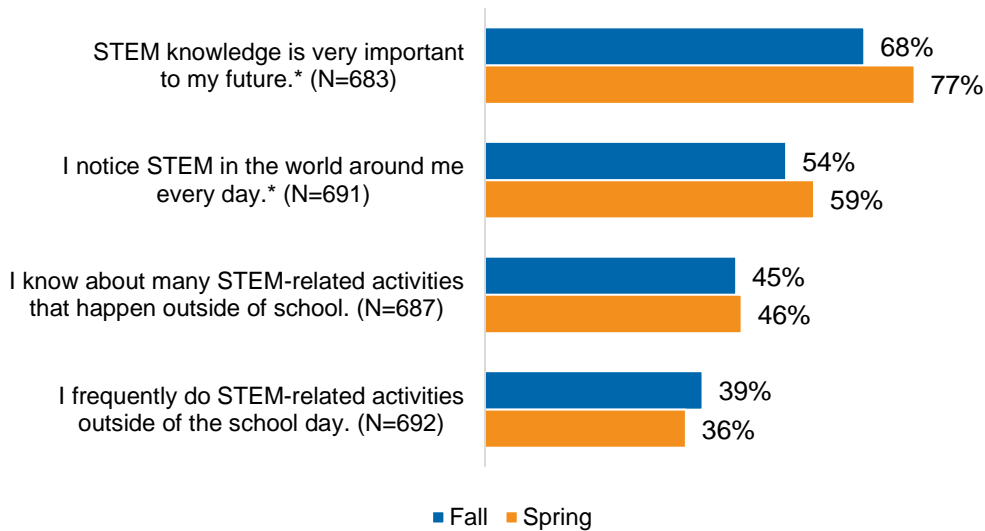
Notice STEM. Overall, the percentage of students who agreed with the statement, “I notice STEM in the world around me every day,” increased significantly from fall to spring. This increase occurred primarily among fourth graders with fifth graders showing little difference in agreement with the statement from fall to spring. This increase was in the “agree a lot” category.

Know about STEM activities. Students’ agreement with the statement, “I know about many STEM-related activities that happen outside of school,” did not change significantly from fall to spring, overall, or in fourth or fifth grade.

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, overall or by grade. The percentage who agreed a lot/mostly agreed with the statement was slightly lower in the spring overall and among fifth graders, and about the same in fall and spring for fourth graders.

4. STEM awareness and relevance: Overall results

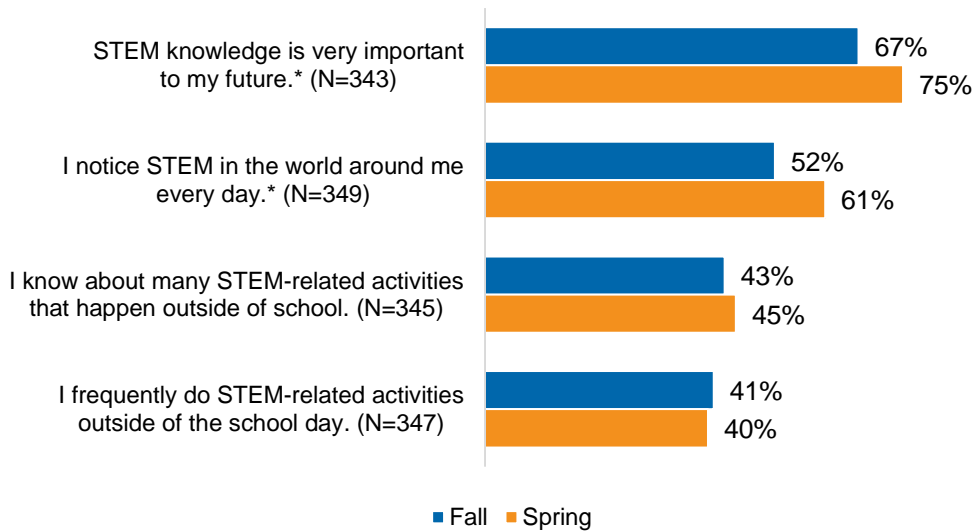
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

5. STEM awareness and relevance: Fourth grade results

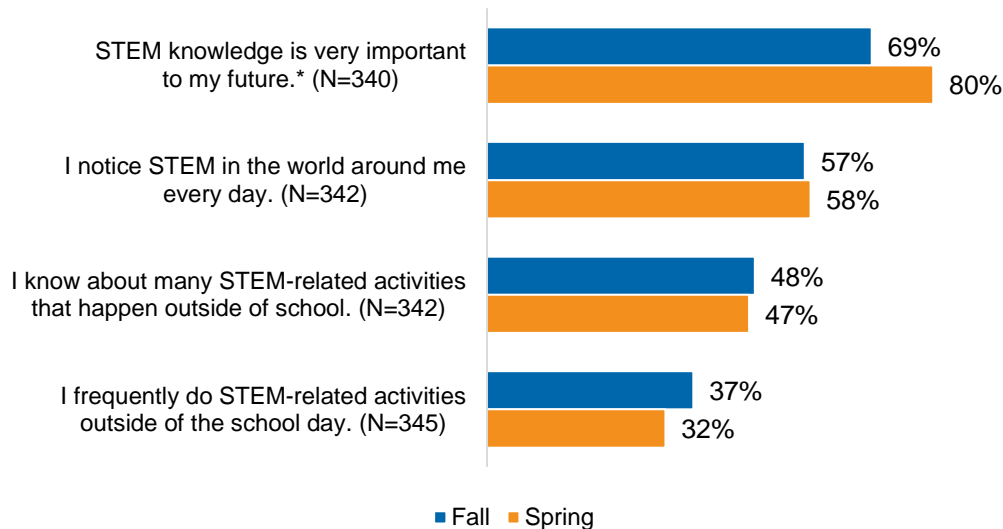
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

6. STEM awareness and relevance: Fifth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

Application of STEM to problem solving

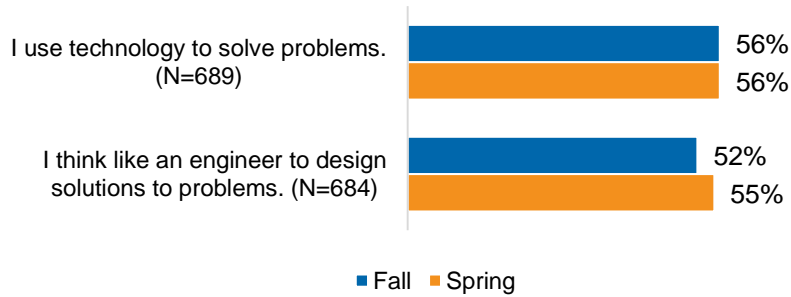
Overall results for the two survey items in this section are provided in Figure 7. Results for these items are provided separately for fourth graders and fifth graders in Figures 8 and 9, respectively.

Use technology. In the fall and spring, the same percentage of students overall agreed with the statement, “I use technology to solve problems.” Similarly, there was very little difference in agreement with the statement between fall and spring for both fourth and fifth graders.

Think like an engineer. Overall, agreement with the statement, “I think like an engineer to design solutions to problems,” did not differ significantly from fall to spring although the percentage who agreed a lot/mostly agreed increased slightly. However, there was a significant increase among fourth graders.

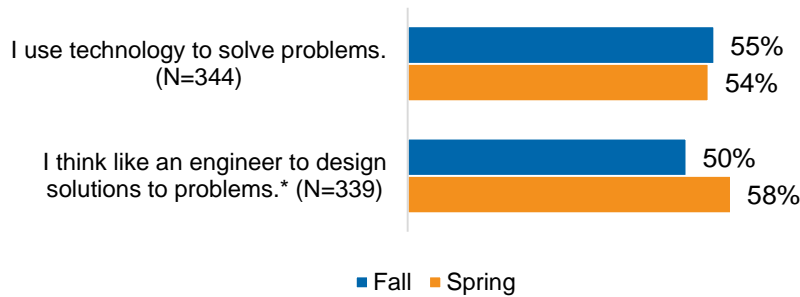
7. Application of STEM to problem solving: Overall results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



8. Application of STEM to problem solving: Fourth grade results

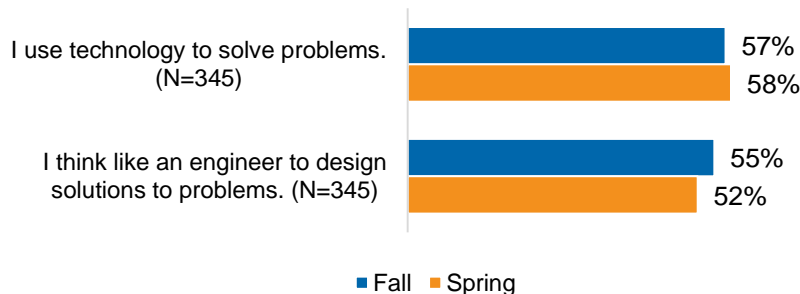
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

9. Application of STEM to problem solving: Fifth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



Careers using STEM

Overall results for the four survey items in this section are provided in Figure 10. Results for these items are provided separately for fourth graders and fifth graders in Figures 11 and 12, respectively. Two of the items in this section were included in earlier sections.

Importance of STEM knowledge. Agreement with the statement, “STEM knowledge is very important for my future,” increased significantly from fall to spring overall, and in fourth and fifth grades. This increase occurred in the “agree a lot” category.

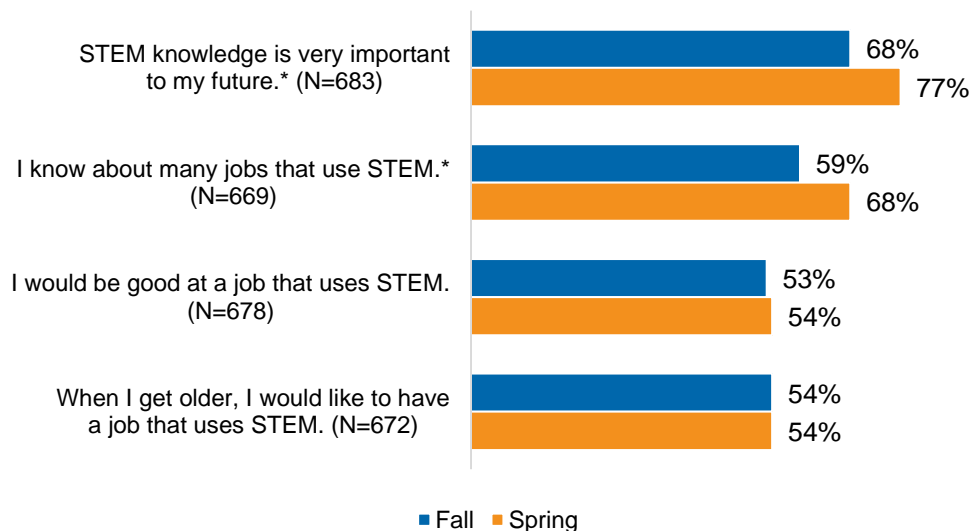
Know about STEM-related jobs. Agreement with the statement, “I know about many jobs that use STEM,” increased significantly from fall to spring overall, and for both fourth graders and fifth graders.

Good at STEM-related job. There was little difference from fall to spring overall, or within fourth or fifth grades, in the percentages who agreed with the statement, “I would be good at a job that uses STEM.”

Like to have STEM-related job. There was little change from fall to spring overall, and within fourth or fifth grade, in the percentage who agreed with the statement: “When I get older, I would like to have a job that uses STEM.” In fifth grade, although the percentage who agreed a lot or mostly agreed stayed about the same from fall to spring, the percentage of “don’t know” responses went up and the percentage of “agree a little” responses went down.

10. Careers using STEM: Overall results

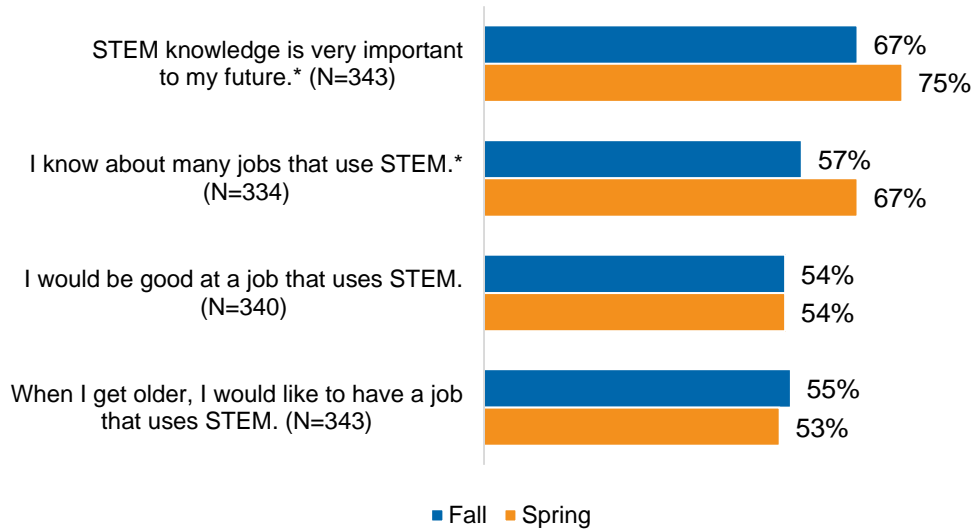
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



*The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).

11. Careers using STEM: Fourth grade results

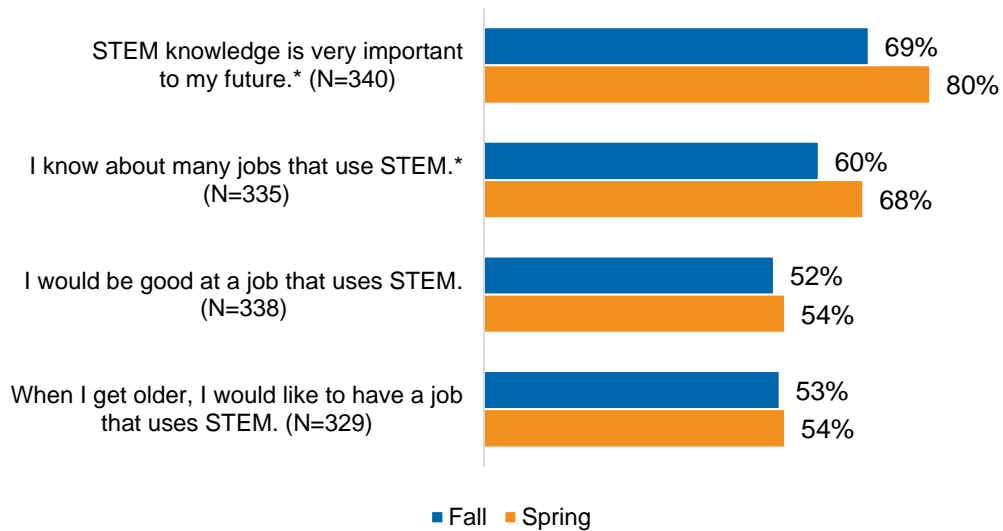
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

12. Careers using STEM: Fifth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



**The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).*

Interest in STEM subjects

Overall results for the four survey items in this section are provided in Figure 13. Results for these items are provided separately for fourth graders and fifth graders in Figures 14 and 15, respectively.

Like math. There was no significant change from fall to spring in the percentage of students who agreed with the statement, “I like learning math.” This was the case overall, and within fourth and fifth grade.

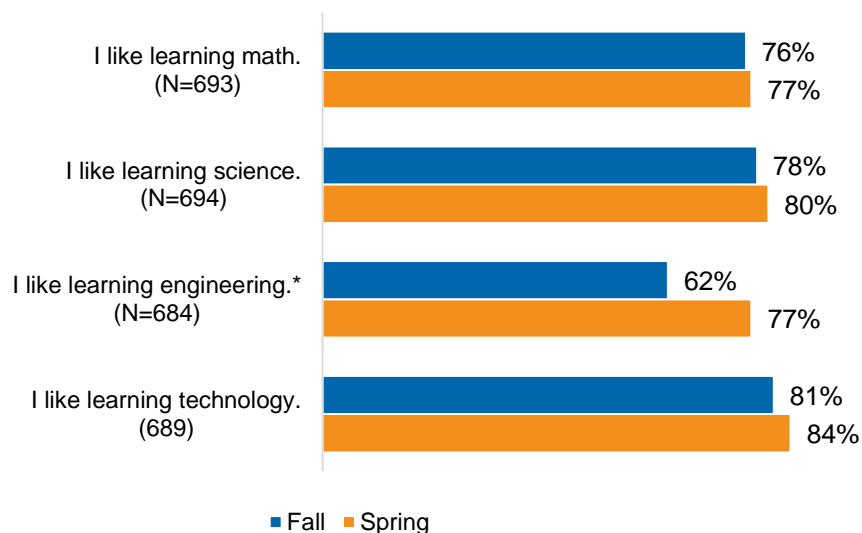
Like science. Similarly, agreement with the statement, “I like learning science,” did not change significantly from fall to spring overall, and within fourth and fifth grade.

Like engineering. The percentage who agreed with the statement, “I like learning engineering,” increased significantly from fall to spring overall. This result was due primarily to the sharp increase in agreement that occurred among fourth graders (from 57% to 81% who agreed a lot/mostly agreed). This large increase among fourth graders was primarily due to a 20 percentage-point increase in “agree a lot” responses (from 38% to 58%) and a 17 percentage-point drop in “don’t know” responses (from 24% to 7%). The increase in agreement among fifth graders was smaller and not significant.

Like technology. Although there was a increase from fall to spring overall, and especially among fourth graders, in those who agreed with the statement, “I like learning technology,” the increases were not significant in either case.

13. Interest in STEM subjects: Overall results

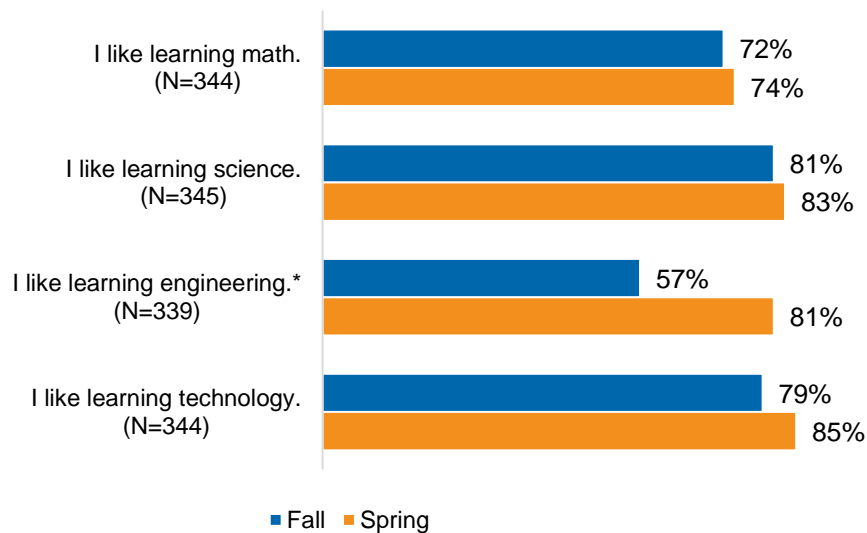
Percentage of students who “agree a lot” or “mostly agree” with each survey item:



*The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).

14. Interest in STEM subjects: Fourth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:

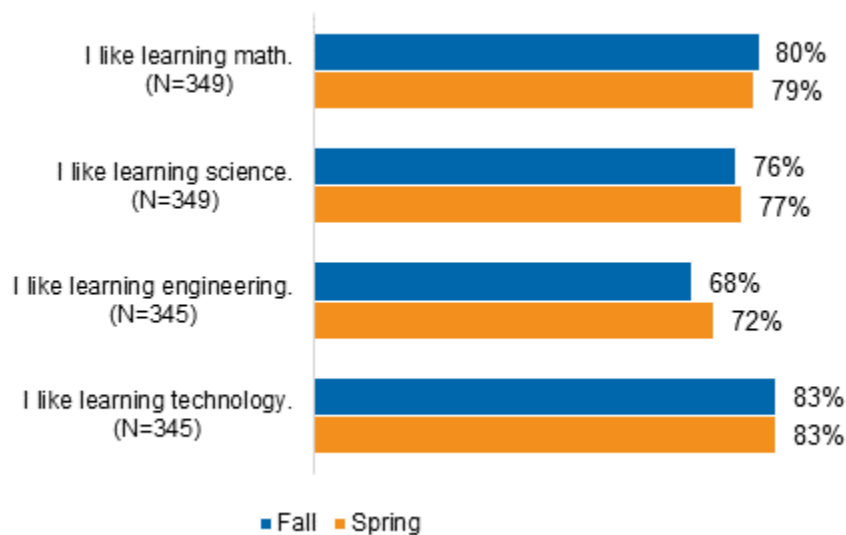


*The change in the percentage of students responding “agree a lot” or “mostly agree” to the item from fall to spring was statistically significant ($p < .05$).

Note: The following survey item was added in spring 2015: How much do you like science? Responses to the answer options by fourth graders were 43 percent “very much,” 29 percent “quite a bit,” 21 percent “some,” and 7 percent “very little.”

15. Interest in STEM subjects: Fifth grade results

Percentage of students who “agree a lot” or “mostly agree” with each survey item:



Results by student characteristics

In this part of the report, results are reported by student demographic characteristics. Results are provided by gender (female, male), free- or reduced-price lunch eligibility (eligible, ineligible), race/ethnicity (students of color, white), and ELL status (ELL, non-ELL).

As indicated earlier, response options to the survey items were: agree a lot, mostly agree, agree a little, don't agree, and don't know. Those who agreed a lot or agreed mostly were considered to be in agreement with an item.

Results by gender

In this section survey results are reported for females and males who completed all or most of the survey in both fall 2014 and spring 2015 in the STEM Pathways schools.

In the figures that follow, an asterisk (*) after a survey item indicates that there is a statistically significant difference ($p < .05$) between the percentage of females and males who responded “agree a lot” or “mostly agree” to the item in spring 2015 (using Fisher’s Exact Test, two-sided). A plus sign (+) after the female or male percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus sign (-) indicates that there was a statistically significant decrease in the percentage (using the McNemar Test, two-sided). When the terms “significant” and “not significant” are used in describing differences in results between females and males or from fall to spring, these terms are referring to the outcome of the statistical tests.

STEM interest and confidence in STEM abilities

For the statement, “I like learning STEM,” there was no significant difference between females and males in the percentage who responded agree a lot or mostly agree in spring 2015, although the percentage was slightly higher for males (Figure 16). The percentages of males who agreed with the statement increased significantly from fall to spring (from 73% to 79%).

Females and males did not differ significantly in their level of agreement with the statement, “I would like to do more STEM-related activities.”

Males were significantly more likely than females to agree with the statement, “I am really good at STEM,” in spring 2015. There was a significant decline from fall to spring in the percentage of females who agreed with the statement (from 56% to 42%).

Males were significantly more likely than females to agree with the statement, “I would be good at a job that uses STEM.”

16. STEM interest and confidence: Females and males

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Female (N=339-348)	Male (N=339-349)
I like learning STEM.	75%	79% (+)
I would like to do more STEM-related activities.	63%	61%
I am really good at STEM.*	42% (-)	57%
I would be good at a job that uses STEM.*	50%	58%

*There is a statistically significant difference ($p < .05$) in the percentage of females and males who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the female or male percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Opportunities for improvement in students’ STEM learning: Awareness and relevance of STEM

There was no significant difference between females and males in the percentages who agreed with the statement, “STEM knowledge is very important to my future,” in the spring (Figure 17). Agreement with the statement increased significantly from fall to spring for both females (from 66% to 76%) and males (from 70% to 79%).

Agreement with the statement, “I notice STEM in the world around me every day,” did not differ significantly between females and males in the spring.

Similarly, females and males did not differ significantly in their level of agreement with statements regarding knowledge of and participation in out-of-school STEM activities.

17. STEM awareness and relevance: Females and males

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Female (N=339-346)	Male (N=339-350)
STEM knowledge is very important to my future.	76% (+)	79% (+)
I notice STEM in the world around me every day.	60% (+)	58%
I know about many STEM-related activities that happen outside of school.	46%	46%
I frequently do STEM-related activities outside of the school day.	36%	37%

Note: A plus (+) after the female or male percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Application of STEM to problem solving

Females and males did not differ significantly in their level of agreement with statements concerning the application of technology and engineering to problem solving (Figure 18).

18. Application of STEM to problem solving: Females and males

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Female (N=341-345)	Male (N=343-344)
I use technology to solve problems.	54%	57%
I think like an engineer to design solutions to problems.	52%	59%

Careers using STEM

There was no significant difference between females and males in the percentages who agreed with the statement, “STEM knowledge is very important to my future” in the spring (Figure 19). Agreement with the statement increased significantly from fall to spring for both females (from 66% to 76%) and males (from 70% to 79%).

Females and males did not differ significantly in their agreement with the statement, “I know about many jobs that use STEM,” in the spring. However, females had a significant increase in their agreement with the statement from fall to spring (from 55% to 66%).

Males were significantly more likely than females to agree with the statement, “I would be good at a job that uses STEM.”

While a somewhat higher percentage of males than females agreed with the statement, “When I get older, I would like to have a job that uses STEM,” the difference was not significant.

19. Careers using STEM: Females and males

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Female (N=337-342)	Male (N=332-341)
STEM knowledge is very important to my future.	76% (+)	79% (+)
I know about many jobs that use STEM.	66% (+)	69%
I would be good at a job that uses STEM.*	50%	58%
When I get older, I would like to have a job that uses STEM.	51%	56%

*There is a statistically significant difference ($p < .05$) in the percentage of females and males who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the female or male percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Interest in STEM subjects

The same percentage of females and males agreed that they liked learning math (Figure 20).

While slightly more males than females agreed that they liked learning science in the spring, the difference was not significant. However, among males, there was a significant increase in agreement from fall to spring (from 77% to 82%).

Males were significantly more likely than females to agree with the statement, “I like learning engineering,” in the spring. Agreement with this statement increased significantly from fall to spring for both females (from 56% to 71%) and males (from 68% to 83%).

Males were significantly more likely than females to agree with the statement, “I like learning technology,” in the spring. Agreement with this statement increased for males from fall to spring (from 84% to 89%).

20. Interest in STEM subjects: Females and males

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Female (N=339-348)	Male (N=344-348)
I like learning math.	77%	77%
I like learning science.	78%	82% (+)
I like learning engineering.*	71% (+)	83% (+)
I like learning technology.*	79%	89% (+)

*There is a statistically significant difference ($p < .05$) in the percentage of females and males who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the female or male percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Results by eligibility for free- or reduced-price lunch

In this section survey results are reported for those eligible and ineligible for free- or reduced-price lunch who completed all or most of the survey in both fall 2014 and spring 2015 in the STEM Pathways schools. Being eligible for free- or reduced-price lunch is an indicator of low family income or poverty.

In the figures that follow, an asterisk (*) after a survey item indicates that there is a statistically significant difference ($p < .05$) between the percentage those eligible and ineligible for free- or reduced-price lunch who responded “agree a lot” or “mostly agree” to the item in spring 2015 (using Fisher’s Exact Test, two-sided).

A plus sign (+) after the eligible or ineligible percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus sign (-) indicates that there was a statistically significant decrease in the percentage (using the McNemar Test, two-sided). When the terms “significant” and “not significant” are used in describing differences in results between the eligible and ineligible or from fall to spring, these terms are referring to the outcome of the statistical tests.

STEM interest and confidence in STEM abilities

Students eligible and ineligible for free or reduced-price lunch did not differ significantly in their agreement with statements about liking to learn STEM and wanting to do more STEM activities (Figure 21).

Those ineligible for free/reduced-price lunch were significantly more likely than those eligible to agree with the statement, “I am really good at STEM,” in the spring. Among the eligible students, there was a significant drop from fall to spring in the percentage who agreed with the statement (from 57% to 46%).

Those ineligible for free/reduced-price lunch were significantly more likely than those eligible to agree with the statement, “I would be good at a job that uses STEM.”

21. STEM interest and confidence: Eligibility for free/reduced-price lunch

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Eligible (N=541-556)	Ineligible (N=136-140)
I like learning STEM.	76%	81%
I would like to do more STEM-related activities.	61%	65%
I am really good at STEM.*	46% (-)	62%
I would be good at a job that uses STEM.*	52%	65%

*There is a statistically significant difference ($p < .05$) in the percentage of those eligible and ineligible for free/reduced-price lunch who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the eligible or ineligible for free/reduced-price lunch percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Opportunities for improvement in students' STEM learning: Awareness and relevance of STEM

Those ineligible for free/reduced-price lunch were somewhat more likely to agree with the statement, “STEM knowledge is very important to my future,” than those eligible, but the difference was not significant. Agreement with the statement increased significantly from fall to spring for both eligible (from 68% to 76%) and ineligible (from 69% to 82%) groups (Figure 22).

Similarly, the ineligible had somewhat higher agreement than the eligible with the statement, “I notice STEM in the world around me every day,” but the difference was not significant.

Again, the ineligible had somewhat higher levels of agreement than the eligible with statements regarding knowledge of and participation in out-of-school STEM activities, but the differences were not significant.

22. STEM awareness and relevance: Eligibility for free/reduced-price lunch

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Eligible (N=545-553)	Ineligible (N=138-140)
STEM knowledge is very important to my future.	76% (+)	82% (+)
I notice STEM in the world around me every day.	58%	63%
I know about many STEM-related activities that happen outside of school.	44%	53%
I frequently do STEM-related activities outside of the school day.	35%	43%

Note: A plus (+) after the eligible or ineligible for free/reduced-price lunch percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Application of STEM to problem solving

Those eligible and ineligible for free/reduced-price lunch did not differ significantly in their level of agreement with statements concerning the application of technology and engineering to problem solving (Figure 23).

23. Application of STEM to problem solving: Eligibility for free/reduced-price lunch

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Eligible (N=545-549)	Ineligible (N=139-140)
I use technology to solve problems.	55%	59%
I think like an engineer to design solutions to problems.	55%	55%

Careers using STEM

Those ineligible for free/reduced-price lunch were somewhat more likely to agree with the statement, “STEM knowledge is very important to my future,” than those eligible, but the difference was not significant. Agreement with the statement increased significantly from fall to spring for both eligible (from 68% to 76%) and ineligible (from 69% to 82%) groups (Figure 24).

The ineligible group was significantly more likely to agree with the statement, “I know about many jobs that use STEM,” in the spring. However, the eligible group had a significant increase in their agreement with the statement from fall to spring (from 56% to 65%).

Those ineligible for free/reduced-price lunch were significantly more likely than those eligible to agree with the statement, “I would be good at a job that uses STEM.”

A significantly higher percentage of those in the ineligible group than the eligible group agreed with the statement, “When I get older, I would like to have a job that uses STEM.”

24. Careers using STEM: Eligibility for free/reduced-price lunch

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Eligible (N=535-545)	Ineligible (N=134-138)
STEM knowledge is very important to my future.	76% (+)	82% (+)
I know about many jobs that use STEM.*	65% (+)	77%
I would be good at a job that uses STEM.*	52%	65%
When I get older, I would like to have a job that uses STEM.*	51%	63%

*There is a statistically significant difference ($p < .05$) in the percentage of those eligible and ineligible for free/reduced-price lunch who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the eligible or ineligible for free/reduced-price lunch percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Interest in STEM subjects

There was no significant difference between the eligible and ineligible groups in their agreement with liking to learn math, engineering, and technology. Agreement with liking to learn engineering increased significantly from fall to spring in both the eligible (from 61% to 76%) and ineligible (from 66% to 78%) groups (Figure 25).

The ineligible group was significantly more likely than the eligible group to agree that they liked to learn science.

25. Interest in STEM subjects: Eligibility for free/reduced-price lunch

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Eligible (N=545-554)	Ineligible (N=137-140)
I like learning math.	78%	74%
I like learning science.*	79%	86%
I like learning engineering.	76% (+)	78% (+)
I like learning technology.	84%	85%

*There is a statistically significant difference ($p < .05$) in the percentage of those eligible and ineligible for free/reduced-price lunch who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the eligible or ineligible for free/reduced-price lunch percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Results by race/ethnicity

In this section survey results are reported for students of color and white students who completed all or most of the survey in both fall 2014 and spring 2015 in the STEM Pathways schools.

In the figures that follow, an asterisk (*) after a survey item indicates that there is a statistically significant difference ($p < .05$) between the percentage of students of color and white students who responded “agree a lot” or “mostly agree” to the item in spring 2015 (using Fisher’s Exact Test, two-sided). A plus sign (+) after the “of color” or “white” percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus sign (-) indicates that there was a statistically significant decrease in the percentage (using the McNemar Test, two-sided). When the terms “significant” and “not significant” are used in describing differences in results between students of color and white students or from fall to spring, these terms are referring to the outcome of the statistical tests.

STEM interest and confidence in STEM abilities

A significantly higher percentage of white students than students of color agreed with the statement, “I like learning STEM,” in spring 2015 (Figure 26).

Students of color and white students did not differ significantly in their level of agreement with the statement, “I would like to do more STEM-related activities.”

White students were significantly more likely than students of color to agree with the statement, “I am really good at STEM,” in spring 2015. Among students of color, there was a significant decrease from fall to spring in the percentage who agreed with the statement (from 56% to 47%).

White students were significantly more likely than students of color to agree with the statement, “I would be good at a job that uses STEM.”

26. STEM interest and confidence: Race/ethnicity

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Of color (N=533-548)	White (N=143-147)
I like learning STEM.*	75%	84%
I would like to do more STEM-related activities.	61%	65%
I am really good at STEM.*	47% (-)	58%
I would be good at a job that uses STEM.*	52%	64%

*There is a statistically significant difference ($p < .05$) in the percentage of students of color and white students who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the “of color” or “white” percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Opportunities for improvement in students’ STEM learning: Awareness and relevance of STEM

Agreement with the statement, “STEM knowledge is very important to my future,” did not differ significantly in the spring between students of color and white students, although the percentage agreeing for white students was somewhat higher (Figure 27). Among students of color, agreement with the statement increased significantly from fall to spring (from 66% to 76%).

The percentage of students of color and white students agreeing with the statement, “I notice STEM in the world around me every day,” did not differ significantly. However, agreement with the statement increased significantly for students of color from fall to spring (from 53% to 59%).

Students of color and white students did not differ significantly in their level of agreement with statements regarding knowledge of and participation in out-of-school STEM activities, although the percentages agreeing were somewhat higher for white students. White students increased their agreement with the knowledge statement (“I know about many STEM-related activities that happen outside of school”) from fall to spring (from 41% to 52%).

27. STEM Awareness and relevance: Race/ethnicity

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Of color (N=540-546)	White (N=143-147)
STEM knowledge is very important to my future.	76% (+)	82%
I notice STEM in the world around me every day.	59% (+)	61%
I know about many STEM-related activities that happen outside of school.	44%	52% (+)
I frequently do STEM-related activities outside of the school day.	35%	41%

Note: A plus (+) after the “of color” or “white” percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Application of STEM to problem solving

Students of color and white students did not differ significantly in their level of agreement with statements concerning the application of technology and engineering to problem solving, although a somewhat higher percentage of white students agreed with the technology statement (Figure 28).

28. Application of STEM to problem solving: Race/ethnicity

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Of color (N=540-542)	White (N=144-147)
I use technology to solve problems.	55%	61%
I think like an engineer to design solutions to problems.	55%	57%

Careers using STEM

Agreement with the statement, “STEM knowledge is very important to my future,” did not differ significantly in the spring between students of color and white students, although the percentage agreeing for white students was somewhat higher (Figure 29). Among students of color, agreement with the statement increased significantly from fall to spring (from 66% to 76%).

A higher percentage of white students than students of color agreed with the statement, “I know about many jobs that use STEM,” in the spring. Agreement with the statement increased significantly from fall to spring for both students of color (from 55% to 64%) and white students (from 72% to 82%).

White students were significantly more likely than students of color to agree with the statement, “I would be good at a job that uses STEM.”

A somewhat higher percentage of white students than students of color agreed with the statement, “When I get older, I would like to have a job that uses STEM.” However, the difference was not significant.

29. Careers using STEM: Race/ethnicity

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Of color (N=540-542)	White (N=144-147)
STEM knowledge is very important to my future.	76% (+)	82%
I know about many jobs that use STEM.*	64% (+)	82% (+)
I would be good at a job that uses STEM.*	52%	64%
When I get older, I would like to have a job that uses STEM.	52%	60%

*There is a statistically significant difference ($p < .05$) in the percentage of students of color and white students who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the “of color” or “white” percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Interest in STEM subjects

Students of color and white students did not differ significantly in their agreement with statements about liking to learn math and science (Figure 30).

Although a somewhat higher percentage of white students than students of color agreed with the statement, “I like learning engineering,” in the spring, the difference was not significant. Agreement with this statement increased significantly from fall to spring for both students of color (from 63% to 75%) and white students (from 61% to 83%).

Although a somewhat higher percentage of white students than students of color agreed with the statement, “I like learning technology,” the difference was not significant.

30. Interest in STEM subjects: Race/ethnicity

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	Of color (N=543-550)	White (N=140-144)
I like learning math.	76%	80%
I like learning science.	79%	84%
I like learning engineering.	75% (+)	83% (+)
I like learning technology.	83%	89%

Note: A plus (+) after the “of color” or “white” percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Results by English Language Learner (ELL) status

In this section survey results are reported for ELL and non-ELL students who completed all or most of the survey in both fall 2014 and spring 2015 in the STEM Pathways schools.

In the figures that follow, an asterisk (*) after a survey item indicates that there is a statistically significant difference ($p < .05$) between the percentage of ELL and non-ELL students who responded “agree a lot” or “mostly agree” to the item in spring 2015 (using Fisher’s Exact Test, two-sided). A plus sign (+) after the ELL or non-ELL percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus sign (-) indicates that there was a statistically significant decrease in the percentage (using the McNemar Test, two-sided). When the terms “significant” and “not significant” are used in describing differences in results between ELL and non-ELL students or from fall to spring, these terms are referring to the outcome of the statistical tests.

STEM interest and confidence in STEM abilities

There was no significant difference in the spring between ELL and non-ELL students in their agreement with statements about liking to learn STEM and wanting to do more STEM activities (Figure 31). However, the percentage of ELL students who agreed that they liked learning STEM increased significantly from fall to spring (from 70% to 78%).

Non-ELL students were significantly more likely than ELL students to agree with the statement, “I am really good at STEM,” in the spring. Agreement with this statement declined significantly from fall to spring among both ELL (from 52% to 40%) and non-ELL (from 62% to 56%) students, but the decline was larger for the ELL group.

Non-ELL students were somewhat more likely than ELL students to agree with the statement, “I would be good at a job that uses STEM,” but the difference was not significant.

31. STEM interest and confidence: ELL and non-ELL

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	ELL (N=265-276)	Non-ELL (N=410-421)
I like learning STEM.	78% (+)	77%
I would like to do more STEM-related activities.	63%	62%
I am really good at STEM.*	40% (-)	56% (-)
I would be good at a job that uses STEM.	50%	57%

*There is a statistically significant difference ($p < .05$) in the percentage of ELL and non-ELL students who responded “agree a lot” or “mostly agree” to the item.

Note: A plus (+) after the ELL or non-ELL percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Opportunities for improvement in students' STEM learning: Awareness and relevance of STEM

There was no significant difference between the percentage of ELL and non-ELL students who agreed with the statement, "STEM knowledge is very important to my future," in the spring. Agreement with the statement increased significantly from fall to spring among both ELL (from 65% to 76%) and non-ELL (from 70% to 78%) students (Figure 32).

Agreement with the statements, "I notice STEM in the world around me every day" and "I know about many STEM-related activities that happen outside of school," did not differ significantly between ELL and non-ELL students.

Compared to non-ELL students, ELL students were significantly less likely to agree with the statement, "I frequently do STEM activities outside of the school day" in the spring. ELL students' agreement with the statement dropped significantly from fall to spring (from 45% to 32%).

32. STEM Awareness and relevance: ELL and non-ELL

Percentage of students who "agree a lot" or "mostly agree" with each survey item in spring 2015:

	ELL (N=272-275)	Non-ELL (N=411-418)
STEM knowledge is very important to my future.	76% (+)	78% (+)
I notice STEM in the world around me every day.	59%	60%
I know about many STEM-related activities that happen outside of school.	45%	46%
I frequently do STEM-related activities outside of the school day.*	32% (-)	39%

*There is a statistically significant difference ($p < .05$) in the percentage of ELL and non-ELL students who responded "agree a lot" or "mostly agree" to the item.

Note: A plus (+) after the ELL or non-ELL percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding "agree a lot" or "mostly agree" to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Application of STEM to problem solving

ELL and non-ELL students did not differ significantly in their level of agreement with statements concerning the application of technology and engineering to problem solving, even though the percentages agreeing with the statements were slightly higher for non-ELL students (Figure 33).

33. Application of STEM to problem solving: ELL and non-ELL

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	ELL (N=269-270)	Non-ELL (N=415-419)
I use technology to solve problems.	53%	58%
I think like an engineer to design solutions to problems.	54%	56%

Careers using STEM

There was no significant difference between the percentage of ELL and non-ELL students who agreed with the statement, “STEM knowledge is very important to my future,” in the spring. Agreement with the statement increased significantly from fall to spring among both ELL (from 65% to 76%) and non-ELL (from 70% to 78%) students (Figure 34).

ELL and non-ELL students did not differ significantly in their level of agreement with the statement, “I know about many jobs that use STEM,” in the spring, even though the percentage agreeing with the statement was somewhat higher for non-ELL students. Agreement with the statement increased significantly from fall to spring for both ELL (from 52% to 64%) and non-ELL (from 63% to 70%) students.

Non-ELL students were somewhat more likely than ELL students to agree with the statement, “I would be good at a job that uses STEM,” but the difference was not significant.

ELL and non-ELL students did not differ significantly in their agreement with the statement, “When I get older, I would like to have a job that uses STEM.”

34. Careers using STEM: ELL and non-ELL

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	ELL (N=265-272)	Non-ELL (N=403-413)
STEM knowledge is very important to my future.	76% (+)	78% (+)
I know about many jobs that use STEM.	64% (+)	70% (+)
I would be good at a job that uses STEM.	50%	57%
When I get older, I would like to have a job that uses STEM.	56%	52%

Note: A plus (+) after the ELL or non-ELL percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

Interest in STEM subjects

There was no significant difference in the spring between the ELL and non-ELL groups in their agreement with liking to learn math, science, engineering, and technology. Agreement with liking to learn engineering increased significantly from fall to spring for both ELL (from 58% to 74%) and non-ELL (from 65% to 78%) students (Figure 35).

35. Interest in STEM subjects: ELL and non-ELL

Percentage of students who “agree a lot” or “mostly agree” with each survey item in spring 2015:

	ELL (N=272-277)	Non-ELL (N=412-417)
I like learning math.	79%	75%
I like learning science.	80%	81%
I like learning engineering.	74% (+)	78% (+)
I like learning technology.	81%	86%

Note: A plus (+) after the ELL or non-ELL percentage indicates that there was a statistically significant increase ($p < .05$) in the percentage responding “agree a lot” or “mostly agree” to the item from fall to spring. A minus (-) indicates that there was a statistically significant decrease in the percentage.

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