



Future City 2020: Evaluation Report

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SUBMITTED TO

DISCOVERE

SUBMITTED BY

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About Concord Evaluation Group (CEG)

CEG is a woman-owned, small business in the Boston area.

We use a variety of evaluation research methods to assess the impact of educational programs and media.

Our mission is to use our evaluation expertise to help improve learning outcomes and enhance the quality of life, especially for underserved communities.

CEG works with a range of audiences--from preschoolers through adults--within the US and abroad.

Find us online at <http://concordevaluation.com>



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Appendices are contained in a separate document.



Background

Future City (<http://futurecity.org>), operating since 1992, is “a national, project-based learning experience where students in sixth, seventh, and eighth grade imagine, design, and build cities of the future. Students work as a team with an educator and engineer mentor to plan cities using SimCity™ software, research and write solutions to an engineering problem, build tabletop scale models with recycled materials, and present their ideas before judges at regional competitions in January. Regional winners represent their region at the National Finals in Washington, DC in February.”

Future City’s cross-curricular educational program gives students an opportunity to do the things that engineers do—identify problems; brainstorm ideas; design solutions; test, retest and build; and share their results (i.e., the engineering design process). With this at its center, Future City is designed to provide an engaging way to build students’ 21st-century skills. Students participating in Future City are expected to:

- Apply math and science concepts to real-world issues.
- Develop writing, public speaking, problem solving, and time management skills.
- Research and propose solutions to engineering challenges.
- Discover different types of engineering and explore career options.
- Learn how their communities work and become better citizens.
- Develop strong teamwork skills.

Concord Evaluation Group (CEG) has conducted evaluations of Future City in 2012, 2014, 2016, and 2020 to assess the degree to which Future City has achieved its objectives.¹ In 2020, CEG collected surveys from students, parents, educators, mentors, judges, and Regional Coordinators (see Appendices A-G for survey instruments). This report summarizes the 2020 wave of data collection and, when appropriate, makes comparisons across years.

¹ We did not administer a Judges Survey until 2016.



Participants

Sample Sizes

We collected data from a total of 3,430 individuals this year. This included 1,560 students, 798 parents from the current year (2020), 8 parents whose children participated last year (2019), 426 educators in the US, 68 educators in China, 152 mentors, 389 judges, and 18 Regional Coordinators.^{2,3}

**Table 1:
Sample Sizes**

	Sample Size
Students	1571
Parents 2020	798
Parents 2019	8
Educators: US	426
Educators: China	68
Mentors	152
Judges	389
Regional Coordinators	18
TOTAL	3,430

² We collected 1,587 student surveys, but 27 surveys were deleted due to suspicious responses (for example, students who claimed they were inanimate objects or answered in discernable patterns that indicated they didn't take the survey seriously).

³ Coordinators in China administered a modified version of the educator survey to 68 educators at the Future City final competition there. We have included the findings in the appendices, but cannot make direct comparisons between US and Chinese educators in the report because the questions were different.

Table 2:
Groups Represented Across Regions in the United States
(N = 3,336)

Region	Students		Parents		Educators		Mentors		Judges	
	N	%	N	%	N	%	N	%	N	%
Alabama	83	5%	13	2%	10	2%	2	1%	5	1%
Arizona	159	10%	37	5%	11	3%	4	3%	24	6%
California (Northern)	0	0%	19	2%	9	2%	3	2%	4	1%
California (Southern)	0	0%	17	2%	12	3%	3	2%	3	1%
Colorado	23	1%	17	2%	10	2%	3	2%	10	3%
Florida (South)	0	0%	8	1%	3	1%	3	2%	7	2%
Florida (Tampa Bay)	0	0%	12	2%	8	2%	2	1%	2	1%
Georgia	0	0%	9	1%	5	1%	1	1%	9	2%
Great Plains	47	3%	31	4%	15	4%	7	5%	17	4%
Idaho	0	0%	43	5%	17	4%	8	5%	29	7%
Illinois (Chicago)	98	6%	29	4%	14	3%	5	3%	8	2%
Indiana	0	0%	15	2%	6	1%	3	2%	4	1%
Iowa	29	2%	18	2%	7	2%	6	4%	12	3%
Kentucky	82	5%	39	5%	12	3%	1	1%	11	3%
Michigan	0	0%	7	1%	10	2%	6	4%	18	5%
Mid-Atlantic	0	0%	7	1%	11	3%	7	5%	6	2%
Minnesota	37	2%	25	3%	15	4%	7	5%	16	4%
Missouri	42	3%	11	1%	5	1%	0	0%	5	1%
Nebraska	40	3%	2	0%	2	0%	2	1%	0	0%
Nevada	11	1%	16	2%	8	2%	1	1%	2	1%
New England	127	8%	16	2%	11	3%	1	1%	2	1%
New Jersey	0	0%	19	2%	17	4%	8	5%	12	3%
New Mexico	93	6%	11	1%	12	3%	5	3%	2	1%
New York (Albany)	99	6%	11	1%	13	3%	2	1%	24	6%
New York (City)	0	0%	18	2%	5	1%	2	1%	8	2%
New York (Western)	0	0%	18	2%	16	4%	1	1%	7	2%
North Carolina	108	7%	36	5%	15	4%	7	5%	16	4%
North Dakota	31	2%	2	0%	4	1%	3	2%	1	0%
Ohio	15	1%	18	2%	9	2%	3	2%	15	4%
Oklahoma	0	0%	21	3%	8	2%	1	1%	4	1%
Pennsylvania (Central)	0	0%	26	3%	6	1%	1	1%	7	2%
Pennsylvania (Philadelphia)	158	10%	66	8%	26	6%	15	10%	8	2%
Pennsylvania (Pittsburgh)	0	0%	16	2%	13	3%	3	2%	10	3%
South Carolina	102	7%	30	4%	20	5%	6	4%	16	4%

Region	Students		Parents		Educators		Mentors		Judges	
	N	%	N	%	N	%	N	%	N	%
Tennessee	0	0%	10	1%	6	1%	3	2%	5	1%
Texas (Houston)	0	0%	6	1%	7	2%	1	1%	4	1%
Texas (North)	0	0%	32	4%	20	5%	7	5%	18	5%
Washington (Inland)	0	0%	5	1%	1	0%	0	0%	3	1%
Washington (Seattle)	25	2%	17	2%	10	2%	2	1%	11	3%
Wisconsin	151	10%	45	6%	17	4%	7	5%	24	6%
TOTALS	1571	100%	798	100%	426	100%	152	100%	389	100%

Regional Coordinators represented the following regions:

- Arizona
- Colorado
- Georgia
- Idaho
- Indiana
- Iowa
- Minnesota
- Missouri
- Nebraska
- New England
- New York (Albany) (2 people)
- New York (City)
- Ohio
- Pennsylvania (Philadelphia) (2 people)
- South Carolina
- Wisconsin

Students

Student’s demographic characteristics are summarized in the table below. The sample contained more girls than boys (48% versus 42%). The proportion of students in grades 6-8 were fairly evenly distributed across grades—35% were eighth graders (down from previous years), 33% were seventh graders, and 25% were sixth graders (up from previous years).

In 2020, 72% of students reported they were White (compared to 57% in 2016). The proportion of Asian students decreased compared to prior years (from 16% in 2014 to 13% in 2016 to 5% in 2020). Hispanic students comprised 13% of the sample and African-American students comprised 7% of the sample. We added two new categories in 2020: Indian (South Asia) at 4% and Middle Eastern at 1%.

Table 3:
Demographic Summary

Characteristic	2014 Total	2016 Total	2020 Total
	N = 559	N = 2,059	N = 1,560
Gender			
Girl	242 (43%)	1003 (49%)	745 (48%)
Boy	255 (46%)	976 (47%)	662 (42%)
Other	62 (11%)	79 (4%)	10 (1%)
Prefer Not to Answer	0 (0%)	0 (0%)	72 (5%)
Missing	62 (11%)	79 (4%)	70 (5%)
Grade			
Sixth	71 (13%)	444 (22%)	388 (25%)
Seventh	156 (28%)	597 (30%)	510 (33%)
Eighth	270 (48%)	915 (46%)	541 (35%)
Missing	62 (11%)	74 (4%)	77 (5%)
Younger or older than middle school	--	--	34 (2%)
Race/ethnicity			
White or European American	353 (63%)	1171 (57%)	1130 (72%)
Hispanic, Latino/a, or Spanish	51 (9%)	281 (14%)	198 (13%)
Black or African-American	27 (5%)	156 (8%)	115 (7%)
Asian American	89 (16%)	271 (13%)	80 (5%)
Indian (South Asia)	--	--	58 (4%)
Native American or Alaskan Native	6 (1%)	52 (3%)	43 (3%)
Middle Eastern	--	--	19 (1%)
Native Hawaiian or Pacific Islander	2 (1%)	17 (1%)	9 (1%)
Prefer Not to Answer	0 (0%)	226 (11%)	24 (2%)

Note: Totals may add up to more than 100% as students could choose more than one race or ethnicity.

Students' previous exposure to engineering is summarized in the table below. More than one-third (38%) of students reported that they were related to an engineer, consistent with prior years.

For two-thirds of students (67%), this was their first year participating in Future City. The proportion of students who were repeating Future City was higher than in prior years.

**Table 4:
Prior Engineering Experiences**

Characteristic	2014 Total	2016 Total	2020 Total
	N = 559	N = 2,059	N = 1,560
Related to an Engineer			
Yes	211 (38%)	883 (45%)	598 (38%)
No	169 (30%)	578 (29%)	474 (30%)
Don't know	118 (21%)	525 (26%)	411 (26%)
Missing	61 (11%)	73 (4%)	77 (5%)
Participated in Future City			
This is first time	402 (72%)	1534 (75%)	1040 (67%)
This is second time	87 (16%)	396 (19%)	331 (21%)
This is third time	17 (3%)	61 (3%)	109 (7%)
Missing	53 (10%)	68 (3%)	79 (5%)

Finally, to place the findings below within context, we asked students to report whether the students mostly made the design decisions for Future City or whether the adults did. Most students reported that they alone made the design decisions (66%), while 30% reported that the adults and students made the decisions together. Only 1% of the students reported that the adults made the design decisions alone for their teams.

Parents

Similar to prior years, the majority of parents in our study (95%) reported that they had one child participating in Future City this year, while the remainder reported having two or more children in the program.

We asked parents to indicate whether they were involved with their children’s Future City group during the year. Nearly all parents (90%) reported that they had been involved in Future City in one capacity or another. Consistent with prior years’ findings, the majority of parents reported that their involvement included offering support or encouragement (82%), attending the competitions (66%), and providing materials or supplies (56%).

**Table 5:
Types of Parent Involvement**

	2014 Total	2016 Total	2020 Total
	N = 330	N = 664	N = 798
Offered support or encouragement	266 (81%)	504 (76%)	653 (82%)
Attended the competition	289 (88%)	573 (86%)	528 (66%)
Provided materials or supplies	203 (62%)	395 (60%)	445 (56%)
Provided space for building, meeting or storing projects	96 (29%)	129 (19%)	337 (42%)
Provided transportation for team (not just my child)	158 (48%)	244 (37%)	240 (30%)
Chaperoned or supervised team at the competition	112 (34%)	242 (36%)	154 (19%)
Shared knowledge or mentored	84 (26%)	182 (27%)	135 (17%)
Helped build models	51 (16%)	110 (17%)	80 (10%)
Edited or reviewed essays	71 (22%)	117 (18%)	75 (9%)
Served as a mock judge to provide feedback to team	68 (21%)	122 (18%)	70 (9%)
Helped the team conduct research	44 (13%)	98 (15%)	66 (8%)
Supervised use of power tools	43 (13%)	88 (13%)	58 (7%)
Helped to write essays	22 (7%)	45 (7%)	31 (4%)

Consistent with prior years, most parents reported donating between 1 and 10 hours to Future City (61%). Five percent reported spending 80 hours or more helping their children’s Future City teams.

**Table 6:
Parent Involvement Hours**

	2020 Total N = 798
1 to 5	354 (44%)
6 to 9	136 (17%)
10 to 19	73 (9%)
20 to 29	49 (6%)
30 to 39	21 (3%)
40 to 49	21 (3%)
50 to 59	16 (2%)
60 to 69	13 (2%)
70 to 79	5 (1%)
80 hours or more	41 (5%)

The background data summarized above is for 2020 parents only. The background data for the 2019 sample are included in the appendices.

Educators

We collected surveys from 426 educators across all the Future City regions. The table below summarizes the educators' backgrounds.⁴

The majority of the educators were teachers in school settings (95%).⁵ Some educators were out-of-school-time leaders (11%) and some were homeschool parents (2%). Consistent with prior surveys, the most commonly taught subjects continued to be science, gifted and talented, technology, math, English language arts, and social studies. In 2020, we have seen the growth of two additional subject areas: STEM or STEAM, engineering, and career and technical education (CTE).

Table 7:
Educators' Background Characteristics
(N = 426)

Characteristic	Number & Percent
Educator Type	
Teacher	404 (95%)
Out-of-school-time leader	46 (11%)
Homeschool parent	9 (2%)
Subjects Taught	
Science	168 (39%)
Gifted and Talented	127 (30%)
Technology	91 (21%)
Math	83 (19%)
English Language Arts	62 (15%)

⁴ In 2020, for the first time, we offered the survey to Future City educators participating in China. The survey was modified in China, so the results are not directly comparable. We have included a summary of the educator survey responses from China in the appendices.

⁵ In 2016, 94% of the educators were teachers and only 4% were out-of-school-time leaders.

Characteristic	Number & Percent
Social Studies	56 (13%)
STEM or STEAM	38 (9%)
Engineering	16 (4%)
Career and Technical Education	8 (2%)
Art	7 (2%)
English (as a new language)	6 (1%)
Design	5 (1%)
Library	3 (1%)

Note: Respondents could select more than one answer, so percentages may exceed 100%.

Approximately 28% of educators reported that this was their first year participating in Future City. Overall, the average educator reported participating in Future City for 4.57 years (standard deviation = 4.20), with a range of one to 22 years. Educators in China reported participating in Future City an average of 1.75 years, with a range of one to six years.

Future City Programs

Nearly two-thirds (65%) of schools included gifted and talented students in their Future City programs, which is a significant increase over 2014 when 25% of programs did.

In 2020, 23% reported including special education students, which is also a significant increase over 2014 when only 8% of programs did.

Also reported in 2020 (we did not collect this previously) was the inclusion of English language learners (22%), students with cognitive differences (19%), and students with physical differences (10%).

As in prior years, organizations were most likely to include 7th and 8th graders in their Future City programs (69% and 70%, respectively).

Table 8:
Grades Included in Programs

	2012 Total	2014 Total	2020 Total
	N = 347	N = 355	N = 426
Sixth	140 (40%)	162 (46%)	251 (59%)
Seventh	228 (66%)	245 (69%)	292 (69%)
Eighth	264 (76%)	269 (76%)	300 (70%)
Other (3 rd or 5 th grades)	2 (0%)	0 (0%)	15 (4%)

Note: Totals may add up to more than 100% as educators could choose more than one grade. This question was not included in the 2016 Educator Survey.

As in prior years, the organizations included in our sample reported that they offered a range of engineering or design and build clubs/courses to students. Once again, the most common offering was technology education classes (55%). We noted increases in the proportion of schools offering engineering classes (from 16% in 2014 to 24% in 2020) and Project Lead the Way (from 11% in 2014 to 18% in 2020).

**Table 9:
Most Common Types of Other Engineering Programs Offered**

Programs	2012 Total	2014 Total	2020 Total
	N = 347	N = 355	N = 426
Technology education classes	189 (55%)	156 (44%)	234 (55%)
FIRST Lego	80 (23%)	67 (19%)	78 (18%)
Guest engineer speakers	80 (23%)	86 (24%)	98 (23%)
Engineering classes	46 (13%)	58 (16%)	100 (24%)
Project Lead the Way	29 (8%)	39 (11%)	77 (18%)

Note: Totals may add up to more than 100% as educators could choose more than one offering. This question was not included in the 2016 Educator Survey.

Most educators reported that they led between one and 20 students in Future City this year (63% in 2020; was 72% in 2014). But, some educators reported leading as many as 100+ students this year in Future City.

As in prior years, about half of all organizations reported that they had one Future City team (51%). Also consistent with prior years, the number of teams ranged from one to 44, with an average of 3.45 teams per school (standard deviation = 4.39).

Most educators (69%) reported that all of their teams attended their regional competitions, while 19% reported that some of their teams did, and 12% reported that none of their teams did.

**Table 10:
Number of Students and Teams Participating in Future City**

	2014 Total	2020 Total
	N = 355	N = 426
Number of Students per Organization		
1 to 20 students	256 (72%)	267 (63%)
21 to 40 students	53 (15%)	85 (20%)
41 to 60 students	17 (5%)	40 (9%)
61 to 80 students	7 (2%)	16 (4%)
81 to 100 students	5 (1%)	6 (1%)
101+ students	6 (2%)	12 (3%)
Missing	11 (3%)	0 (0%)
Number of Teams per Organization		
1 team	176 (50%)	217 (51%)
2 teams	48 (14%)	45 (11%)
3 teams	39 (11%)	66 (15%)
4 to 10 teams	60 (17%)	68 (16%)
11 to 20 teams	24 (7%)	27 (6%)
Missing	8 (2%)	0 (0%)

Note: These questions were not included in the 2016 Educator Survey.

As summarized in the table below, most organizations offered Future City as a part of a class (48%) or as a club (39%). Very few offered Future City as both a class and a club (13%). These findings are highly consistent with the data collected in 2016.

**Table 11:
How Organizations Offered Future City**

	2014 Total	2016 Total	2020 Total
	N = 355	N = 369	N = 426
Part of a class	134 (38%)	185 (50%)	203 (48%)
As a club	159 (45%)	140 (38%)	168 (39%)
Both	50 (14%)	43 (12%)	55 (13%)
Missing	12 (3%)	1 (0%)	0 (0%)

In 2020, half of the programs offered Future City during school (50%). More than one-third of programs (39%) offered Future City after school hours, which is consistent with 2016.

Table 12:
When Organizations Offered Future City

	2012 Total	2014 Total	2016 Total	2020 Total
	N = 347	N = 355	N = 369	N = 426
Mostly after school hours	148 (43%)	169 (48%)	134 (36%)	164 (39%)
Mostly during school hours	142 (41%)	117 (33%)	184 (50%)	212 (50%)
Equally during and after school	53 (15%)	54 (15%)	51 (14%)	48 (11%)
Missing	4 (1%)	15 (4%)	0 (0%)	0 (0%)

Educators reported the number of hours that they and their students worked on Future City this year. For the average student who competed in a competition, 34% of educators reported that the students dedicated between 21 and 60 hours to Future City (down from 44% who reported the same in 2014). For Future City students who *did not* attend a competition, 36% of educators reported that students worked fewer than 40 hours.

In 2020, roughly half of educators (47%) reported that they worked between 21 and 60 hours on Future City (41% of educators worked this much in 2014). Thirty-one percent of educators reported that they worked more than 80 hours this year. This is consistent with 2014 results.

Table 13:
Number of Hours Dedicated to Future City

	2014 Total	2020 Total
	N = 355	N = 426
Students Who DID Go to Competition		
Fewer than 20 hours	15 (4%)	3 (1%)
21 to 40 hours	71 (20%)	66 (15%)
41 to 60 hours	84 (24%)	79 (19%)
61 to 80 hours	66 (19%)	78 (18%)
81 to 100 hours	38 (11%)	87 (20%)
101+ hours	54 (15%)	69 (16%)
Missing	27 (8%)	43 (10%)
Students Who DID NOT Go to Competition		
Fewer than 20 hours	101 (29%)	64 (15%)
21 to 40 hours	74 (21%)	90 (21%)
41 to 60 hours	45 (13%)	67 (16%)
61 to 80 hours	33 (9%)	61 (14%)

	2014 Total	2020 Total
	N = 355	N = 426
81 to 100 hours	13 (4%)	36 (9%)
101+ hours	7 (2%)	23 (5%)
Missing	82 (23%)	85 (20%)
Educators		
Fewer than 20 hours	29 (8%)	28 (7%)
21 to 40 hours	77 (22%)	105 (25%)
41 to 60 hours	69 (19%)	92 (22%)
61 to 80 hours	61 (17%)	69 (16%)
81 to 100 hours	41 (12%)	60 (14%)
101+ hours	63 (18%)	72 (17%)
Missing	15 (4%)	0 (0%)

Note: These questions were not included in the 2016 Educator Survey.

Half of the educators reported that their Future City program had the support of a mentor this year (50%) and another 15% reported that they had a mentor for at least for part of the year.

Looking at the data over time, there appears to be a definite trend downward, with fewer and fewer educators reporting having a full-time mentor over time.

**Table 14:
Mentor Support**

	2012 Total	2014 Total	2016 Total	2020 Total
	N = 347	N = 355	N = 369	N = 426
Yes	209 (60%)	205 (58%)	201 (55%)	211 (50%)
No	73 (21%)	79 (22%)	108 (29%)	151 (35%)
For part of year	50 (14%)	49 (14%)	60 (16%)	64 (15%)
Missing	0 (0%)	22 (6%)	0 (0%)	0 (0%)

Mentors

Mentors' professional background characteristics are summarized in the table below. Most mentors reported that they were professional engineers (72%). As in prior years, the most common types of engineers were civil (28%), electrical (14%), and mechanical (13%). Mentors reported that they belonged to a wide variety of national engineering associations. As in other years, the two associations represented most frequently were the ASCE (18%) and the IEEE (13%).

Table 15:
Mentors' Professional Backgrounds

	2014 Total N = 90	2016 Total N = 103	2020 Total N = 152
Profession			
Engineer	75 (83%)	82 (80%)	109 (72%)
Architect	2 (2%)	3 (3%)	4 (3%)
Project Manager	2 (2%)	7 (7%)	9 (6%)
Technician	2 (2%)	--	2 (1%)
City Planner	1 (1%)	5 (5%)	14 (9%)
Other	8 (9%)	6 (5%)	24 (16%) ⁶
Types of Engineers			
Civil	22 (24%)	39 (48%)	42 (28%)
Electrical	13 (14%)	14 (17%)	22 (14%)
Mechanical	13 (14%)	14 (17%)	19 (13%)
Environmental	6 (7%)	5 (6%)	14 (9%)
Chemical	3 (3%)	7 (9%)	10 (7%)
Systems	--	--	9 (6%)
Computer	7 (8%)	7 (9%)	6 (4%)
Aerospace	2 (2%)	2 (2%)	4 (3%)
Manufacturing	--	--	4 (3%)
Industrial	6 (7%)	4 (5%)	3 (2%)
Ceramics & Materials	1 (1%)	--	3 (2%)
Agricultural	--	--	2 (1%)
Fire Protection	--	--	1 (1%)
Nuclear	--	--	1 (1%)
Biomedical	--	--	1 (1%)
Missing or N/A	17 (19%)	6 (7%)	0 (0%)
Memberships in National Engineering Associations			
ASCE	16 (18%)	22 (21%)	27 (18%)
IEEE	16 (18%)	9 (9%)	19 (13%)

⁶ Includes teachers, artists, environmental educators, PhD students, and computer programmers.

	2014 Total	2016 Total	2020 Total
	N = 90	N = 103	N = 152
ACEC	2 (2%)	5 (5%)	10 (7%)
NSPE	1 (1%)	7 (7%)	8 (5%)
NCESS	3 (3%)	--	6 (4%)
NSBE	--	--	6 (4%)
AICHE	2 (2%)	--	5 (3%)
ASHE	--	2 (2%)	5 (3%)
SWE	5 (6%)	4 (3%)	5 (3%)
ASME	1 (1%)	9 (9%)	4 (3%)
ITE	--	5 (5%)	4 (3%)
NSF	--	--	3 (2%)
AWWA	--	--	2 (1%)
WEF	--	--	2 (1%)
SHPE	1 (1%)	--	2 (1%)
Other	--	23 (22%)	33 (22%)

Note: Totals may add up to more than 100% as mentors could choose more than one option. In 2020, “other” includes 1 count each of the following: ACI, ACS, AES, AFT, AIAA, AICP, AIST, APWA, AREMA, ASABE, ASHRAE, ASTM, AWT, CAA, ESD, GEM Consortium, IISE, ITS Pennsylvania, Military Operations Research Society, MiSHE, MN Concrete & Masonry Contractors Association, NADCA, North Carolina Future City Committee, NSPS, PMI, PNCWA, SAME, SFPE, SPE, The Natural Stone Institute, TMS, USGBC, UTC, WAFSCM.

In 2020, the average number of years that mentors reported having worked with children as mentors or volunteers including Future City, was 7.58 years (standard deviation = 7.15), with a range of one to 27 years. This is slightly less time than mentors reported in 2016 (average was 8.18 years, with a standard deviation of 4.40).

In 2020, mentors reported volunteering as a Future City mentor for an average of 3.89 years (standard deviation = 4.545), with a range of one to 27 years. This is, on average, nearly three year less than mentors reported in 2016 (average was 6.25 years, with a standard deviation of 4.00). **Thus, it appears that many mentors are newer in 2020 than in 2016.**

In 2020, half (53%) of the mentors reported that they had previously served as Future City judges and 21% had previously served as competition volunteers.

**Table 16:
Mentors' Years of Experience**

	2020 Total
	N = 152
Working with Children as a Mentor or Volunteer	
1 – This is first year	31 (20%)
2	16 (11%)
3	14 (9%)
4	7 (5%)
5	11 (7%)
6	7 (5%)
7	3 (2%)
8	6 (4%)
9	4 (3%)
10	14 (9%)
11 or more	36 (24%)
Volunteering as a Future City Mentor	
1 – This is first year	64 (42%)
2	22 (14%)
3	19 (13%)
4	6 (4%)
5 or more	40 (26%)
Besides Mentor, Role(s) Played in Future City	
Judge	39 (53%)
Competition volunteer	15 (21%)
Organizing committee	10 (7%)
Other	4 (3%)

Mentors reported having many different motivations for volunteering to be a Future City mentor. The most popular reasons were that they wanted to encourage student interest in STEM (18%), they enjoyed working with students (17%), and that they enjoyed the experience and found it to be rewarding (17%).

Table 17:
Mentors' Motivation for Volunteering

	2020 Total
	N = 152
Encourage student interest in STEM	102 (18%)
Enjoy working with students	95 (17%)
Enjoy the experience, it's rewarding	92 (17%)
Desire to volunteer/mentor	79 (14%)
Asked by a teacher, colleague, or friend	76 (14%)
Interest in Future City	71 (13%)
My own relative (child, nephew/niece) is participant	34 (6%)

Consistent with prior years, most mentors reported working up to 60 hours total on Future City (78%) in 2020.

Table 18:
Number of Hours Dedicated to Future City

	2014 Total	2020 Total
	N = 90	N = 152
Fewer than 20 hours	21 (23%)	37 (25%)
21 to 40 hours	25 (28%)	52 (34%)
41 to 60 hours	21 (23%)	28 (19%)
61 to 80 hours	7 (8%)	17 (11%)
81 to 100 hours	6 (7%)	7 (5%)
101+ hours	6 (7%)	10 (7%)
Missing	4 (4%)	0 (0%)

Note: This question was not included in the 2016 Mentor Survey.

Judges

Judges' professional background characteristics are summarized in the table below. Most judges reported that they were professional engineers (52%) and project managers (15%). As in prior years, the most common types of engineers were civil (40%), electrical (9%), and mechanical (8%). Also common this year were computer engineers (9%) and environmental engineers (9%). Judges reported that they belonged to a wide variety of national engineering associations. As in other years, the two associations represented most frequently were the ASCE (20%) and ACEC (7%).

Table 19:
Judges' Professional Backgrounds

	2016 Total N = 491	2020 Total N = 389
Profession		
Engineer	332 (67%)	255 (52%)
Project Manager	17 (4%)	76 (15%)
Architect	9 (2%)	11 (2%)
Technician	--	16 (3%)
City Planner	20 (4%)	12 (2%)
Other	111 (23%)	19 (5%)
Type of Engineer		
Civil	152 (46%)	135 (40%)
Computer	11 (3%)	32 (9%)
Electrical	53 (16%)	32 (9%)
Environmental	30 (9%)	29 (9%)
Mechanical	42 (13%)	26 (8%)
Systems	--	17 (5%)
Chemical	15 (5%)	12 (4%)
Industrial	11 (3%)	15 (4%)
Aerospace	11 (3%)	8 (2%)
Biomedical	--	5 (2%)
Ceramics & Materials	7 (2%)	6 (2%)
Manufacturing	7 (2%)	8 (2%)
Agricultural	8 (2%)	2 (1%)
Missing or N/A	26 (8%)	29 (8%)
Memberships in National Engineering Associations		
ASCE	87 (18%)	77 (20%)
ACEC	15 (3%)	28 (7%)
IEEE	28 (6%)	23 (6%)
NSPE	33 (7%)	24 (6%)
NCESS	7 (1%)	24 (6%)
SWE	27 (6%)	16 (4%)

	2016 Total	2020 Total
	N = 491	N = 389
ASME	13 (3%)	10 (3%)
AICHE	9 (2%)	9 (2%)
ASHE	11 (2%)	7 (2%)
ITE	15 (3%)	6 (2%)
WEF	--	6 (2%)
ASHRAE	7 (1%)	5 (1%)
NSBE	3 (1%)	5 (1%)
AWWA	5 (1%)	4 (1%)
Other	39 (8%)	23 (6%)

Note: Totals may add up to more than 100% as judges could choose more than one option. In 2020, “other” includes 1 count each of the following: AAEEES, AAPD, AGIC, American Society of Landscape Architects, ANS, APLS, APTi, ASABE, ASCM, ASE, ASEE, ASFPM, Chi Epsilon, CIE-USA, CMAA, ECKC, Illuminating Engineering Society of North America, Institute for Sustainable Infrastructure (ISI), ION, NOGLSTP, NSF, SFPE (Society of Fire Protection Engineers), and Women in Nuclear.

In 2020, the average number of years that judges reported having worked with children as judges, mentors, or other types of volunteers including Future City, was 9.01 years (standard deviation = 8.12), with a range of one to 27 years. This is more time than judges reported in 2016 (average was 7.40 years, with a standard deviation of 4.20).

In 2020, judges reported volunteering as a Future City judge for an average of 4.18 years (standard deviation = 4.36), with a range of one to 27 years. This is less experience than judges reported in 2016 (average was 5.40 years, with a standard deviation of 3.60). **Thus, it appears that, like mentors, many judges are newer in 2020 than in 2016.**

In 2020, nearly two-thirds of the judges (64%) reported that they had previously served as Future City competition volunteers and 19% had previously served as mentors.

**Table 20:
Judges' Years of Experience**

	2020 Total N = 389
Working with Children as a Volunteer	
1 – This is first year	54 (15%)
2	31 (9%)
3	26 (8%)
4	25 (7%)
5	40 (12%)
6	15 (4%)
7	7 (2%)
8	9 (3%)
9	2 (1%)
10	36 (10%)
11 or more	98 (25%)
Volunteering as a Future City Judge	
1 – This is first year	123 (32%)
2	68 (17%)
3	43 (11%)
4	26 (7%)
5 or more	123 (32%)
Besides Judge, Role(s) Played in Future City	
Competition volunteer	86 (64%)
Mentor	26 (19%)
Organizing committee	18 (13%)
Other	4 (2%)

Judges reported having many different motivations for volunteering to be a Future City judge. The most popular reasons were that they wanted to encourage student interest in STEM (19%), that they enjoyed the experience and found it to be rewarding (18%), and that they are interested in Future City (15%).

**Table 21:
Judges' Motivation for Volunteering**

	2020 Total N = 369
Encourage student interest in STEM	243 (19%)
Enjoy the experience, it's rewarding	239 (18%)
Interest in Future City	189 (15%)
Enjoy working with students	185 (14%)
Asked by a teacher, colleague, or friend	144 (11%)
My own relative (child, nephew/niece) is participant	3 (1%)

Most judges reported fewer than 20 hours total on Future City (91%) in 2020.

**Table 22:
Number of Hours Dedicated to Future City**

	2020 Total N = 369
Fewer than 20 hours	347 (91%)
21 to 40 hours	25 (7%)
41 to 60 hours	6 (2%)
61 to 80 hours	1 (0%)
81 to 100 hours	3 (1%)
101+ hours	1 (0%)
Missing	--

Note: This question was not included in the 2016 Judge Survey.

Regional Coordinators

Regional Coordinators’ background characteristics are summarized in the table below. Unlike 2016, most Regional Coordinators that responded to the 2020 survey were volunteers (78%). Most had served in prior roles, including as judges (44%), mentors (33%), and other roles (28%).

Table 23:
Regional Coordinators’ Background Experiences

	2016 Total N = 38	2020 Total N = 18
Other Roles Served		
Judge	5 (13%)	8 (44%)
Mentor	7 (18%)	6 (33%)
Other	10 (26%)	5 (28%)
No response	16 (42%)	4 (22%)
Paid or Volunteer Position		
Volunteer	7 (18%)	14 (78%)
Paid	31 (82%)	4 (22%)

Note: Totals may add up to more than 100% as respondents could choose more than one option.

Coordinators’ years of experience with Future City—in any capacity—ranged from one year to 25 years. The average number of years was 11.76 (with a standard deviation of 8.01 years).



Findings

Students

Workload and Satisfaction

As summarized in the table below, more than two-thirds of students (68%) reported that Future City was **challenging**, while, at the same time, most (87%) also reported that it was **worth the effort**.

Moreover, most students agreed that **presenting their ideas to the judges was worthwhile** (79%), that they felt a **sense of accomplishment being a part of Future City** (87%), and that **they would participate again**, if they could (75%).

Table 24:
Satisfaction with Future City

Proportion of Students Who Agreed or Strongly Agreed	2020 Total
	N = 1,560
Future City was challenging.	1067 (68%)
Future City was worth the effort.	1353 (87%)
Presenting our team's ideas to the judges was worthwhile.	1237 (79%)
I feel a sense of accomplishment about being part of Future City.	1358 (87%)
I would participate in Future City again, if I could.	1166 (75%)

Note: These questions were new for 2020.

Appreciation for Engineers and Engineering Work

We asked students a series of questions designed to measure their appreciation for engineers and the work that engineers do. Eighty percent or more of students reported that Future City:

- Helped them see that engineers can be helpful to society.
- Helped them appreciate all the engineering that goes into a city.
- Helped them see the value in working with a team to solve problems.

We noted, however, that several of the items trended downward from 2014 to 2020. To explore the question of why so many of these items trended downward over time we first looked for any major differences in the composition of the samples over time. One major difference we noted was that the 2020 sample was younger than samples from prior years. So, we next looked at the correlation between grade and agreement with the items included in the table. What we found was a statistically significant correlation between grade and appreciation.⁷ **Thus, it appears that the differences over time in appreciation scores are likely due, in part, to the younger age of the sample in 2020 versus prior years.**

Specifically, we found that:

- Most students reported that Future City helped them see that engineers can be **helpful to society** (85%). Students with mentors were significantly more likely to agree than students without mentors.⁸
- Most students reported that Future City helped them **appreciate all the engineering that goes into a city** (85%). This finding has held fairly consistent over the years. Students with mentors were significantly more likely to agree than students without mentors.⁹

⁷ For the purposes of this analysis, we combined the items into a single “appreciation” scale to correlate with student grade. The items formed a reliable scale (Cronbach’s alpha = .85). The correlation was significant ($r_{(1439)} = .122, p = .000$).

⁸ Average = 4.25 versus 4.03 out of 5.00 ($t_{(df=1260)}=3.792, p = .000$).

⁹ Average = 4.28 versus 4.09 out of 5.00 ($t_{(df=1259)}=3.164, p = .002$).

- Most students believed that Future City has helped them see the **value in working with a team to solve problems** (82%). This is roughly similar to 2014 (84%) but down from 2016 (89%). Students with mentors were significantly more likely to agree.¹⁰
- Most students reported that Future City helped them see that **math and science were important to their future** (76%). This is lower than in prior years, when 84% and 85% of students agreed. There were no differences between students with and without mentors.
- Most students agreed that Future City helped them find an **outlet for their creativity and imagination** (75%). This is lower than in prior years, when 79% and 86% of students agreed. There were no differences between students with and without mentors.
- Many students reported that Future City helped them appreciate the **importance of civics issues** like politics and taxes (59%). This proportion is down from 73% in 2016. Students with mentors were significantly more likely to agree than students without mentors.¹¹
- About half of students reported that Future City helped them see a **connection between their own interests and a career in engineering** (46%). There were no differences between students with or without mentors.
- About half of students reported that Future City made them **interested in doing other engineering clubs or activities** (45%). This proportion is down from prior years when it was 61% and 69%. There was no significant difference between students with and without mentors.
- More than one-third of students reported that Future City led them to **think about future careers** (39%). Students with mentors were significantly more likely to agree than students without mentors.¹²

¹⁰ Average = 3.97 versus 3.77 out of 5.00 ($t_{(df=220,661)}=3.627$, $p = .000$).

¹¹ Average = 3.71 versus 3.49 out of 5.00 ($t_{(df=234,441)}=2.707$, $p = .007$).

¹² Average = 3.28 versus 3.09 out of 5.00 ($t_{(df=1274)}=2.543$, $p = .011$).

- More than one-third of students reported that they could **picture themselves working as an engineer** (37%). This is down significantly from prior years when the proportions were 65% and 62% and there were no differences between students with and without mentors for this question.

**Table 25:
Appreciation for Engineers and Engineering Work**

Proportion of Students Who Agreed or Strongly Agreed	2014 Total	2016 Total	2020 Total
	N = 559	N = 2,059	N = 1,560
<i>Future City...</i>			
... helped me see that engineers can be helpful to society.	--	--	1323 (85%)
... helped me appreciate all the engineering that goes into a city.	454 (88%)	1769 (89%)	1318 (85%)
... has helped me see the value in working with a team to solve problems.	434 (84%)	1767 (89%)	1277 (82%)
... has helped me see that math and science are important to my future.	434 (84%)	1688 (85%)	1188 (76%)
... has helped me find an outlet for my creativity and imagination.	408 (79%)	1707 (86%)	1165 (75%)
... helped me appreciate the importance of civic issues like politics and taxes.	--	1447 (73%)	918 (59%)
... has helped me see a connection between my own interests and a career in engineering.	--	--	711 (46%)
... made me interested in doing other engineering clubs or activities.	318 (61%)	1368 (69%)	696 (45%)
...started me thinking about future careers.	--	--	604 (39%)
...helped me picture myself working as an engineer.	336 (65%)	1216 (62%)	572 (37%)

Note: For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

Sense of Community

We asked students questions designed to assess the extent to which they felt a sense of community as a result of their Future City experience, as summarized in the table below. **We found strong evidence that having a mentor matters greatly to students' sense of community.** We found that:

- Many students believed there are **supportive professionals in the field** who can help them (71%). Students with mentors were significantly more likely to agree than students without mentors.¹³
- Likewise, many students felt like they were **part of the Future City community** (70%). Students with mentors were significantly more likely to agree than students without mentors.¹⁴

Table 26:
Sense of Community

Proportion of Students Who Agreed or Strongly Agreed	2020 Total
	N = 1,560
I believe there are supportive professionals in the field who can help me become an engineer if I want.	1105 (71%)
I feel like I am a part of the Future City community.	1090 (70%)

Note: These questions were new for 2020.

¹³ Average = 3.93 versus 3.70 out of 5.00 ($t_{(df=223,582)}=3.137$, $p = .002$).

¹⁴ Average = 4.04 versus 3.83 out of 5.00 ($t_{(df=1259)}=2.924$, $p = .004$).

Impact on Skills and Knowledge

We asked students a series of questions designed to measure the perceived impact of Future City on students, as summarized in the table below. The greatest impact observed was that 80% of students reported that **Future City taught them that they can work in a team to create something with little direction from a teacher**. The smallest impact observed was that only 39% of students reported that Future City helped them in their other classes.

As with the appreciation items discussed earlier, we noted that there were many impacts that decreased over time from 2014 to 2020. To explore the question of why so many of these items trended downward over time, we again looked at the correlation between grade and agreement with the items included in the table. Again, we found a statistically significant correlation between grade and appreciation.¹⁵ **Thus, it appears that the differences over time in impact scores are likely due, in part, to the younger age of the sample in 2020 versus prior years.**

Specifically, we found that:

- Most students agreed that Future City taught them that they can work in a team to **create something with little direction from a teacher** (80%). This is lower than in prior years when it was 86% and 88% of students. Students with mentors were significantly more likely to agree.¹⁶
- Most students reported that Future City helped them **improve their ability to work with a team** (78%). This proportion is down slightly from 82% and 83% in prior years. Students with mentors were significantly more likely to agree.¹⁷

¹⁵ For the purposes of this analysis, we combined the items into a single “impact” scale to correlate with student grade. The items formed a highly reliable scale (Cronbach’s alpha = .92). The correlation was significant ($r_{(1439)} = .094, p = .000$).

¹⁶ Average = 4.19 versus 3.97 out of 5.00 ($t_{(df=1251)}=3.405, p = .001$).

¹⁷ Average = 4.19 versus 3.95 out of 5.00 ($t_{(df=1252)}=3.541, p = .000$).

- Most students agreed that Future City helped them **learn how to plan a project** (77%). This proportion is much lower than in prior years (91% and 90%). Students with mentors were significantly more likely to agree.¹⁸
- Most students agreed that Future City helped them **learn how cities work** (76%). This is lower than in prior years, when 88% and 85% of students agreed. Students with mentors were significantly more likely to agree.¹⁹
- Most students agreed that Future City helped them **learn how to break a project down into manageable parts** (74%). Students with mentors were significantly more likely to agree.²⁰
- Most students reported that Future City helped them **learn about the engineering design process** (74%). Students with mentors were significantly more likely to agree.²¹
- Many students reported that Future City helped them **improve their problem-solving skills** (73%). This is lower than in prior years, when 83% and 86% of students agreed. Students with mentors were significantly more likely to agree.²²
- Many students agreed that Future City helped them learn **how to use engineering to solve real-world problems** (72%). This is lower than in prior years, when 81% and 83% of students agreed. Students with mentors were significantly more likely to agree.²³
- Many students reported that Future City helped them learn **how to apply math and science to real-world problems** (69%). This is lower than in prior years, when 75% and 83% of students agreed. Students with mentors were significantly more likely to agree.²⁴

¹⁸ Average = 4.03 versus 3.85 out of 5.00 ($t_{(df=221.003)}=2.602$, $p = .010$).

¹⁹ Average = 4.13 versus 3.94 out of 5.00 ($t_{(df=1241)}=2.971$, $p = .003$).

²⁰ Average = 3.99 versus 3.84 out of 5.00 ($t_{(df=1259)}=2.164$, $p = .031$).

²¹ Average = 4.04 versus 3.84 out of 5.00 ($t_{(df=1250)}=2.939$, $p = .003$).

²² Average = 4.09 versus 3.88 out of 5.00 ($t_{(df=1237)}=3.045$, $p = .002$).

²³ Average = 4.03 versus 3.76 out of 5.00 ($t_{(df=225.6929)}=3.616$, $p = .000$).

²⁴ Average = 3.97 versus 3.77 out of 5.00 ($t_{(df=231.952)}=2.690$, $p = .008$).

- Many students agreed that Future City helped them **improve their time management skills** (67%). This is lower than in prior years, when 74% of students agreed. Students with mentors were significantly more likely to agree.²⁵
- Many students reported that Future City helped them **improve their research skills** (65%). This is lower than in prior years, when 71% and 79% of students agreed. Students with mentors were significantly more likely to agree.²⁶
- Many students reported that Future City helped them **improve their public speaking skills** (63%). This is lower than in prior years, when 72% and 74% of students agreed. Students with mentors were significantly more likely to agree.²⁷
- Many students reported that Future City **boosted their confidence** (59%). This is lower than in prior years, when 67% and 75% of students agreed. Students with mentors were significantly more likely to agree.²⁸
- About half of students agreed that Future City helped them **feel empowered to make changes in their own community** (53%). There were no differences between students with or without mentors.
- Fewer than half of students reported that Future City helped to **improve their writing skills** (42%). This is lower than in prior years, when 56% and 67% of students agreed. Students with mentors were significantly more likely to agree.²⁹
- Fewer than half of students reported that Future City **helped them in their other classes** (39%). This is lower than in prior years, when 48% and 57% of students agreed. Students with mentors were significantly more likely to agree.³⁰

²⁵ Average = 3.90 versus 3.69 out of 5.00 ($t_{(df=1247)}=2.784$, $p = .005$).

²⁶ Average = 3.88 versus 3.69 out of 5.00 ($t_{(df=1245)}=2.501$, $p = .013$).

²⁷ Average = 3.87 versus 3.62 out of 5.00 ($t_{(df=1248)}=2.914$, $p = .004$).

²⁸ Average = 3.78 versus 3.48 out of 5.00 ($t_{(df=1243)}=3.414$, $p = .001$).

²⁹ Average = 3.33 versus 3.11 out of 5.00 ($t_{(df=246,325)}=2.484$, $p = .014$).

³⁰ Average = 3.27 versus 2.93 out of 5.00 ($t_{(df=242,479)}=3.729$, $p = .000$).

Table 27:
Impacts on Skills and Knowledge

Proportion of Students Who Agreed or Strongly Agreed	2014 Total	2016 Total	2020 Total
	N = 559	N = 2,059	N = 1,560
<i>Future City...</i>			
... taught me that I can work in a team to create something with little direction from a teacher.	445 (86%)	1749 (88%)	1241 (80%)
... helped me improve my ability to work with a team.	441 (82%)	1646 (83%)	1222 (78%)
... helped me learn how to plan a project.	494 (91%)	1788 (90%)	1195 (77%)
... helped me learn how cities work.	475 (88%)	1697 (85%)	1192 (76%)
... helped me learn how to break a project down into manageable parts.	--	--	1156 (74%)
... helped me learn about the engineering design process.	--	--	1150 (74%)
... helped me improve my problem-solving skills.	434 (83%)	1689 (86%)	1142 (73%)
... helped me learn how to use engineering to solve real-world problems.	435 (81%)	1669 (83%)	1120 (72%)
... helped me learn how to apply math and science to real-world problems.	401 (75%)	1665 (83%)	1076 (69%)
... helped me improve my time management skills.	390 (74%)	1483 (74%)	1048 (67%)
... helped me improve my research skills.	378 (71%)	1556 (79%)	1019 (65%)
... helped me improve my public speaking skills.	382 (72%)	1473 (74%)	978 (63%)
... boosted my confidence in myself.	345 (67%)	1480 (75%)	912 (59%)
... helped me feel empowered to make changes in my own community.	--	--	833 (53%)
... helped me improve my writing skills.	302 (56%)	1342 (67%)	658 (42%)
... helped me in my other classes.	248 (48%)	1115 (57%)	615 (39%)

Note: For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

SimCity

Finally, we asked students to report which aspects of SimCity were most useful to them, if any. Students reported the following were useful:

- Seeing how design decisions they made affected the city (60%)
- Learning about zoning (45%)
- Learning about infrastructure (31%)
- Learning about taxes (29%)
- Learning about civics issues (23%)
- None of the above (11%)

Parents

This section includes findings for the 2020 parent sample only. Since the 2019 sample was small, those findings are summarized in the appendices.

Satisfaction

We asked parents to report on the extent to which Future City met their expectations (regardless of what their expectations were). As in prior years, most parents reported that **Future City fully met or exceeded their expectations (84%)**.

**Table 28:
Degree to Which Parental Expectations were Met**

	2014 Total	2016 Total	2020 Total
	N = 330	N = 664	N = 798
Exceeded expectations	136 (41%)	263 (40%)	286 (35%)
Fully met expectations	144 (44%)	314 (47%)	393 (49%)
Partially met expectations	35 (11%)	52 (8%)	93 (12%)
Did not meet expectations	3 (1%)	5 (1%)	22 (3%)
Missing	12 (4%)	30 (5%)	14 (2%)

We asked parents whether they would recommend Future City to other parents. Consistent with prior years, most (90%) reported that they would, 8% reported that they might, and only 2% reported that they would not recommend it.

**Table 29:
Proportion of Parents Who Would Recommend Future City**

	2014 Total	2016 Total	2020 Total
	N = 330	N = 664	N = 798
Yes	290 (88%)	624 (94%)	723 (90%)
Maybe	24 (7%)	--	63 (8%)
No	5 (2%)	--	12 (2%)
Missing	11 (3%)	40 (6%)	10 (1%)

We also asked parents whether their children felt a sense of accomplishment about being part of Future City—84% reported that they did.

Appreciation for Engineers and Engineering Work

We asked parents to report on a set of questions related to their children’s appreciation for engineers and engineering work. Most (82%) reported that **Future City helped their children see that engineers can be helpful to society**. Nearly two-thirds (64%) reported that it **helped their children see a connection between their own interests and a career in engineering**. Slightly more than half (55%) reported that their children are now **thinking about future careers**, and 53% reported that their children can **picture themselves working as an engineer someday**. This 53% was much lower than the proportion in 2016 (81%) and appears to be due, in part, to the young age of the 2020 sample.³¹

Table 30:
Parent Reports on Student Appreciation for Engineers and Engineering Work

	2016 Total	2020 Total
	N = 664	N = 798
<i>Future City helped my child(ren)...</i>		
...see that engineers can be helpful to society.	--	660 (82%)
...see a connection between their own interests and a career in engineering.	--	519 (64%)
...start thinking about future careers.	--	444 (55%)
...picture themselves working as an engineer someday.	517 (81%)	428 (53%)

Note: Most of these questions were new in 2020. For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

³¹ Grade and agreement levels for this question were significantly correlated ($r_{(770)}=.078, p=.015$).

Sense of Community

We asked parents to report on the degree to which their children felt like part of the Future City community—68% reported that their children did feel like part of a community.

Table 31:
Parent Reports on Student Sense of Community

	2020 Total
	N = 798
<i>Future City helped my child(ren)...</i>	
...feel like they are part of the Future City community.	549 (68%)

Note: This question was new in 2020.

Impact on Skills and Knowledge

Most parents reported that Future City had a positive impact on their children across a number of different areas (see table below). Eighty percent or more of parents agreed or strongly agreed that Future City helped their children...

- ...learn about how cities work.
- ...learn how to plan a project.
- ...improve their ability to work with a team.
- ...learn about the engineering design process.
- ...feel comfortable working in a team to create something with little direction from a teacher.
- ...learn how to use engineering to solve real world problems.
- ...learn how to break down a project into manageable parts.

While, overall, parents in 2020 listed many of the same top impacts as parents in other years, the proportion of parents who agreed that they observed each of these impacts was—as with the student data—notably lower over time than levels of agreement for previous years. So, we combined the impact items in the table below to create an impact scale that we correlated with

student grade to see if the same correlation we observed among students existed in the parent data. However, there was no correlation between student grade and parent impact scores, so the younger student sample cannot explain the differences.³²

Table 32:
Parent Reports on Impacts on Skills and Knowledge

	2014 Total N = 330	2016 Total N = 664	2020 Total N = 798
<i>Future City helped my child(ren)...</i>			
...learn about how cities work.	304 (95%)	591 (94%)	682 (84%)
...learn how to plan a project.	301 (95%)	579 (91%)	660 (82%)
...improve their ability to work with a team.	--	593 (93%)	658 (81%)
...learn about the engineering design process.	293 (92%)	--	648 (80%)
...feel comfortable working in a team to create something with little direction from a teacher.	--	585 (92%)	646 (80%)
...learn how to use engineering to solve real world problems.	291 (93%)	567 (89%)	646 (80%)
...learn how to break down a project into manageable parts.	--	--	643 (80%)
...improve their problem-solving skills.	286 (90%)	578 (92%)	636 (79%)
...learn how to apply math and science to real world problems.	278 (88%)	549 (86%)	634 (79%)
...improve their research skills.	268 (87%)	559 (88%)	607 (75%)
...improve their self-confidence.	--	--	597 (74%)
...learn to be a better citizen.	228 (73%)	--	581 (72%)
...improve their time management skills.	250 (80%)	515 (81%)	552 (68%)
...improve their public speaking skills.	265 (85%)	541 (85%)	547 (68%)
...improve their writing skills.	216 (71%)	497 (78%)	495 (61%)
...feel empowered to make changes in our own community.	--	--	486 (60%)

Note: For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

³² For the purposes of this analysis, we combined the items into a single “impact” scale to correlate with student grade. The items formed a highly reliable scale (Cronbach’s alpha = .98). The correlation between grade and the impact scale was not significant ($r_{(771)} = .040, p = .144$).

One Year Follow-Up

We asked 2019 parents two additional questions:

- To what extent is your child (the child who did Future City LAST year) interested in learning about engineering NOW?
- In THIS school year (2019-2020), has this same child continued to do any engineering or STEM activities? If so, which ones?

Six out of eight parents reported that their children were **still interested or very interested in learning about engineering now**. One was unsure and one was neutral.

Five out of eight parents reported that **their children have continued doing engineering or STEM activities since being part of Future City last year**. One parent was unsure and two reported that their children had not continued doing STEM or engineering activities.

The five parents who reported that their children continued doing STEM or engineering mentioned the following activities:

- Courses and clubs at school (three parents)
- Future City (two parents)
- Girl Scouts or Boy Scouts
- Science Olympiad

Additional Comments

In the 2019 sample, one parent noted:

- *Students should self-group, not be grouped by teacher/leader.*

Parents in the 2020 sample contacted CEG directly after completing the survey to share additional thoughts. “That information has is listed below. Please note, we have reproduced the text verbatim as it was given to us.”

- *I wanted to mention that I enjoyed watching my daughter take part in Future City. Just a few things I wanted to mention. Other Future City websites in other regions mentioned on their websites what the awards names would be and the criteria for winning those awards. The Southern California website did not. When my daughter's team won an award for their project, they still don't know why they did so, and what criteria they met to have won that award.*

Secondly, one of the teams from her same school also took home a couple of awards. The award being for best model. Having said that, one of the parents from that team was in conflict with two other parents from the same team because she felt the parents were building the model instead of her daughter and her daughter's teammates. They weren't even allowed to touch the model at one point. Hence, it became a model built by parents. I was told about this even before they won. And one of the parents was an artist. How do you ensure every team gets a fair chance at winning when parents can get their hands on them? This by far is the reason I may not spend the extra time and money next time to drive to LA and back so that my daughter and her teammates can submit their projects to be in competition with parents' projects. Not a good learning experience for the kids and a bit deflating the spirit of this competition. I am sure this happens more than just one instance. Perhaps finding a way to keep parent's hands off children's projects would create a better learning experience for them, a more fun experience when the children don't feel that they followed the rules when others did not, and equals the playing field in the completion.

- *I would appreciate it if you could pass along the suggestion to move the competition to the nearby convention center. The space on campus at the UT Arlington engineering complex was far too small for both the competition and the awards ceremonies.*
- *I'm a parent of a student that entered the Future City contest. I just filled out the survey, but I didn't see any part where we can put comments. The program itself is excellent. My daughter learned many skills from working on future project. The only improvement that I would like to see is the announcer during the Washington state competition. She was not very professional. She made comments about kids' names that were not common. She stated she could not pronounce many of the names and did not announce them when they won an award. She only called the team's name, but called out some of the easy to pronounce names. Some of the awards she called out, she failed to announce what it was for. The kids worked so hard on their projects, but the way the announcer called out awards made them feel like it was not very special. I suggest that she be replaced by someone more professional next year.*

If you are interested, we actually encouraged our daughter to participate because she had expressed interest in becoming an engineer. After participating in Future City, she decided she definitely does not want to be an engineer. I asked her why. She said she doesn't want to have such a stressful career and she wants a career in an industry with more women. It bothered her that only 2 of the judges were women and that one of the men was particularly mean.

She did learn about working with a team and was proud of her group's finished project.

- *I responded to this and was really hoping for a chance to say a bit about our own competition. The same school wins every single year in our region and they have Future Cities as a class rather than as an activity. It would be so great to give other kids a chance, too. They all work so hard!*

Educators

Satisfaction

We asked educators to report on the extent to which Future City met their expectations. Most educators reported that **Future City fully met or exceeded their expectations (84%)**. This is an improvement over 2016, when 76% reported that it had.

**Table 33:
Degree to Which Educator Expectations were Met**

	2014 Total	2016 Total	2020 Total
	N = 355	N = 369	N = 427
Exceeded expectations	106 (30%)	74 (20%)	99 (23%)
Fully met expectations	182 (51%)	205 (56%)	261 (61%)
Partially met expectations	41 (12%)	76 (21%)	58 (14%)
Did not meet expectations	9 (3%)	12 (3%)	8 (2%)
Missing	17 (5%)	2 (1%)	2 (1%)

We asked educators whether they would recommend Future City to other educators. **The proportion in 2020 who would recommend Future City increased over prior years.** Most (90%) reported that they would recommend it, 10% reported that they might, and only 1% reported that they would not recommend it.

**Table 34:
Proportion of Educators Who Would Recommend Future City**

	2014 Total	2016 Total	2020 Total
	N = 355	N = 369	N = 427
Yes	294 (83%)	310 (84%)	382 (90%)
Maybe	35 (10%)	--	42 (10%)
No	6 (2%)	--	1 (1%)
Missing	20 (6%)	59 (16%)	2 (1%)

Nearly all educators reported that they felt a **sense of accomplishment** participating in Future City (90%), and that they **would participate again** (89%). Most educators also reported that they now feel like they are **part of a Future City community** (79%).

**Table 35:
Educator Satisfaction**

	2020 Total
	N = 427
I felt a sense of accomplishment participating in Future City.	382 (90%)
I would participate in Future City again.	381 (89%)
My students felt a sense of accomplishment about being part of Future City	380 (89%)
As an educator, I feel like I am part of a Future City community.	335 (79%)

Note: These questions are new for 2020.

Workload

Consistent with 2016, **most educators reported that the Future City workload was appropriate** for them (67%) and their students (65%). In 2016, a project plan component was added to the competition, which may explain the decrease from 2014 to 2016 and 2020. But, levels appear not to have changed significantly in the last four years. In addition, nearly all educators reported that **Future City was challenging for them and their students and that it was worth the effort**. Moreover, nearly all reported that it was **worthwhile presenting their ideas to the judges**.

**Table 36:
Educator Perceptions of Appropriateness of Workload**

	2014 Total	2016 Total	2020 Total
	N = 355	N = 369	N = 427
The amount of work Future City required was appropriate for my students.	289 (86%)	248 (68%)	284 (67%)
The amount of work Future City required was appropriate for me.	270 (80%)	226 (62%)	278 (65%)
Future City was challenging for my students.	--	--	407 (95%)
Future City was challenging for me.	--	--	350 (82%)
Future City was worth the effort.	--	--	383 (90%)
Presenting our ideas to the judges was worthwhile.	--	--	375 (88%)

Note: Questions marked with "--" were asked differently in 2014 and 2016 so we cannot make comparisons.

Appreciation for Engineers and Engineering Work

Nearly all educators (92%) reported that Future City helped their students **see that engineers can be helpful to society**. Most also reported that it helped their students **see a connection between their own interests and a career in engineering** (84%).

Most educators (77%) also reported that Future City helped their students **picture themselves working as engineers someday** and that **more of their students** could picture becoming engineers than before. Finally, many educators (74%) reported that Future City helped their students **think about future careers**.

Table 37:
Educator Reports on Student Appreciation for Engineering and Engineering Knowledge

	2020 Total N = 427
<i>Future City helped my students...</i>	
...see that engineers can be helpful to society.	392 (92%)
...see a connection between their own interests and a career in engineering.	360 (84%)
More of my students than before can now picture themselves working as engineers someday.	330 (77%)
...picture themselves working as an engineer someday.	329 (77%)
...start to think about future careers.	317 (74%)

Note: These questions were new for 2020. For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

Sense of Community

We asked educators to report on the degree to which their students felt like part of the Future City community—80% reported that their students **did feel like part of a community**.

Table 38:
Educator Reports on Student Sense of Community

	2020 Total
	N = 427
<i>Future City helped my students...</i>	
...feel like they are part of the Future City community.	341 (80%)

Note: This question was new in 2020.

Impact on Skills and Knowledge

Most educators reported that Future City had a positive impact on their students across a number of different areas (see table below). Eighty percent or more of educators agreed or strongly agreed that Future City helped their students...

- ...learn about how cities work.
- ...improve their problem-solving skills.
- ...learn how to use engineering to solve real world problems.
- ...learn how to apply math and science to real world problems.
- ...learn about the engineering design process.
- ...learn how to plan a project.
- ...learn how to break down a project into manageable parts.
- ...improve their ability to work with a team.
- ...improve their research skills.
- ...improve their public speaking skills.
- ...improve their confidence.
- ...improve their time management skills.

- ...feel comfortable working in a team to create something with little direction from a teacher.

The one area where educators saw the *least* impact, and therefore, may indicate a place that Future City could focus on in the future, was whether students felt empowered to make changes in their own communities as a result of participating in Future City—67% of educators reported that they observed this impact. This was also one of the impacts least reported by parents.

Unlike the parent surveys in 2020, the educator results are fairly consistent with prior years, although there are a few cases where they are different. Notably:

- In 2020, educators were *more* likely than educators in 2016 to agree that Future City helped their students learn how to apply math and science to real world problems. The 2020 level was more consistent with 2014 than 2016.
- In 2020, educators were *more* likely than educators in 2016 to agree that Future City helped their students improve their time management skills. Both 2016 and 2020 levels were lower than 2014 levels.
- In 2020, educators were *more* likely than educators in 2014 to agree that Future City helped their students learn to be better citizens. This question was not asked in 2016.
- In 2020, educators were *less* likely than educators in 2016 to agree that Future City helped their students improve their public speaking skills. In fact, there appears to be a downward trend for this item from 2014 to 2020.
- In 2020, educators were *less* likely than educators in 2016 to agree that Future City helped their students improve their writing skills.

**Table 39:
Educator Reports on Impacts on Skills and Knowledge³³**

	2014 Total N = 355	2016 Total N = 369	2020 Total N = 427
<i>Future City helped my students...</i>			
...learn about how cities work.	326 (96%)	--	383 (90%)
...improve their problem-solving skills.	270 (80%)	333 (90%)	381 (89%)
...learn how to use engineering to solve real world problems.	310 (91%)	319 (86%)	380 (89%)
...learn how to apply math and science to real world problems.	311 (92%)	280 (76%)	379 (89%)
...learn about the engineering design process.	300 (88%)	--	378 (89%)
...learn how to plan a project.	330 (97%)	--	374 (88%)
...learn how to break a project down into manageable parts.	--	--	367 (86%)
...improve their ability to work with a team.	--	348 (94%)	365 (86%)
...improve their research skills.	299 (89%)	312 (86%)	363 (85%)
...improve their public speaking skills.	322 (95%)	329 (89%)	362 (85%)
...improve their confidence.	--	--	346 (81%)
...improve their time management skills.	281 (84%)	293 (79%)	345 (81%)
...learn that they can work in a team to create something with little direction from a teacher.	--	--	341 (80%)
...improve their writing skills.	275 (81%)	312 (86%)	320 (75%)
...learn to be better citizens.	244 (71%)	--	322 (75%)
...feel empowered to make changes in our own community.	--	--	288 (67%)

Note: For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

³³ We combined the items into a single “impact” scale to determine how reliable it was. The items formed a highly reliable scale (Cronbach’s alpha = .97).

Chinese Educators

A detailed summary of the educator data from China is included in Appendix K.

Educators from China reported that the top three subjects that most closely aligned with Future City were science, geography, and art.

Ninety-three percent of educators reported that Future City promotes students' subject learning.

When asked about which abilities Future City can help develop, their top three responses included teamwork, problem solving, and a tie between engineering design and public display (assumed to mean public speaking skills).

Chinese educators reported that Future City helps students pay more attention to urban and social issues, improves their self-confidence, and helps them understand how cities work.

Mentors

Satisfaction

We asked mentors to report on the extent to which Future City met their expectations. Consistent with prior years, most mentors reported that **Future City fully met or exceeded their expectations (76%)**.

**Table 40:
Degree to Which Mentor Expectations were Met**

	2014 Total	2016 Total	2020 Total
	N = 90	N = 103	N = 152
Exceeded expectations	23 (26%)	22 (22%)	25 (16%)
Fully met expectations	52 (58%)	56 (55%)	92 (60%)
Partially met expectations	7 (8%)	23 (23%)	32 (21%)
Did not meet expectations	0 (0%)	1 (1%)	2 (1%)
Missing	8 (9%)	1 (1%)	2 (1%)

We asked mentors whether they would recommend Future City to their colleagues. **The proportion in 2020 who would recommend Future City increased between 2014 and 2020.** Most (92%) reported that they would recommend it, 7% reported that they might, and only 1% reported that they would not recommend it.

**Table 41:
Proportion of Mentors Who Would Recommend Future City**

	2014 Total	2020 Total
	N = 90	N = 152
Yes	74 (82%)	140 (92%)
Maybe	8 (9%)	10 (7%)
No	0 (0%)	1 (1%)
Missing	8 (9%)	2 (1%)

Nearly all mentors reported that they felt a **sense of accomplishment** participating in Future City (85%), and that they **would participate again** (90%). Most mentors also reported that they now feel like they are **part of a Future City community** (75%). Consistent with 2016, nearly all mentors agreed or strongly agreed that **Future City represents the field of engineering**.

**Table 42:
Mentor Satisfaction**

	2016 Total	2020 Total
	N = 103	N = 152
I felt a sense of accomplishment participating in Future City.	--	130 (85%)
I would participate in Future City again.	--	137 (90%)
As a mentor, I feel like I am part of a Future City community.	--	114 (75%)
Future City represents the field of engineering.	89 (89%)	138 (91%)

Note: Three of these questions are new for 2020.

Workload

Consistent with 2016, **most mentors reported that the Future City workload was appropriate** for them (79%), but a smaller proportion of mentors in 2020 reported that the amount of work was appropriate for their students compared to prior years (68% versus 76% in 2016 and 74% in 2014). **So, it appears that in 2020, mentors perceived there to be more work for their students than in prior years despite the fact that the workload did not change officially.**

Despite the amount of work, nearly all mentors reported that **Future City was challenging for their students and that it was worth the effort.** Moreover, nearly all reported that it was **worthwhile presenting their ideas to the judges.**

Only 61% of mentors reported that Future City was challenging for them.

**Table 43:
Mentor Perceptions of Appropriateness of Workload**

	2014 Total	2016 Total	2020 Total
	N = 90	N = 103	N = 152
The amount of work Future City required was appropriate for my students.	60 (74%)	77 (76%)	104 (68%)
The amount of work Future City required was appropriate for me.	67 (81%)	77 (77%)	121 (79%)
Future City was challenging for my students.	--	--	131 (91%)
Future City was challenging for me.	--	--	93 (61%)
Future City was worth the effort.	--	--	139 (91%)
Presenting our ideas to the judges was worthwhile.	--	--	135 (88%)

Note: Questions marked with "--" were asked differently in 2014 and 2016 so we cannot make comparisons.

Appreciation for Engineers and Engineering Work

Nearly all mentors (96%) reported that Future City helped their students **see that engineers can be helpful to society**. Most also reported that it helped their students **see a connection between their own interests and a career in engineering** (86%). Most mentors (78%) also reported that Future City helped their students **picture themselves working as engineers someday**. Finally, many mentors (73%) reported that Future City helped their students **think about future careers**.

Table 44:
Mentor Reports on Student Appreciation for Engineering and Engineering Knowledge

	2020 Total
	N = 152
<i>Future City helped my students...</i>	
...see that engineers can be helpful to society.	147 (96%)
...see a connection between their own interests and a career in engineering.	131 (86%)
...picture themselves working as an engineer someday.	119 (78%)
...start to think about future careers.	111 (73%)

Note: These questions were new for 2020. For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

Sense of Community

We asked mentors to report on the degree to which their students felt like part of the Future City community—66% reported that their students **did feel like part of a community**.

Table 45:
Mentor Reports on Student Sense of Community

	2020 Total
	N = 152
<i>Future City helped my students...</i>	
...feel like they are part of the Future City community.	101 (66%)

Note: This question was new in 2020.

Impact on Skills and Knowledge

Most mentors reported that Future City had a positive impact on their students across a number of different areas (see table below). Eighty percent or more of mentors agreed or strongly agreed that Future City helped their students:

- Learn about how cities work.
- Learn how to use engineering to solve real world problems.
- Feel a sense of accomplishment about being part of Future City.
- Improve their ability to work with a team.
- Improve their problem-solving skills.
- Learn how to apply math and science to real world problems.
- Learn about the engineering design process.
- Learn how to plan a project.
- Improve their public speaking skills.
- Improve their research skills.

These same observations were made by educators, who also listed these items above as the top impacts they observed.

The findings, overall, point to fewer observed impacts than in prior years. The findings here are similar to parent reports. Notably:

- In 2020, mentors were *more* likely than mentors in 2016 and *less* likely than mentors in 2015 to agree that Future City helped their students learn how cities work.
- In 2020, mentors were *more* likely than mentors in 2016 and *less* likely than mentors in 2015 to agree that Future City helped their students learn how to apply math and science to real world problems.
- In 2020, mentors were *less* likely than mentors in prior years to agree that Future City helped their students:
 - improve their ability to work with a team,
 - learn about the engineering design process,
 - learn how to plan a project,
 - improve their public speaking skills,
 - improve their writing skills,
 - improve their time management skills, and
 - learn to be better citizens (for parents, there was no difference over time on this impact).

Table 46:
Mentor Perceptions of Impact on their Students³⁴

	2014 Total	2016 Total	2020 Total
	N = 90	N = 103	N = 152
<i>Future City helped my students...</i>			
...learn about how cities work.	81 (99%)	87 (85%)	137 (90%)
...learn how to use engineering to solve real world problems.	75 (92%)	--	137 (90%)
...feel a sense of accomplishment about being part of Future City.	--	--	131 (86%)
...improve their ability to work with a team.	80 (99%)	96 (94%)	130 (85%)
...improve their problem-solving skills.	--	86 (84%)	129 (84%)
...learn how to apply math and science to real world problems.	72 (88%)	66 (65%)	128 (84%)
...learn about the engineering design process.	79 (96%)	--	127 (83%)
...learn how to plan a project.	74 (93%)	--	126 (82%)
...improve their public speaking skills.	90 (99%)	92 (92%)	124 (81%)
...improve their research skills.	74 (83%)	--	123 (80%)
...learn how to break down a project into manageable parts.	--	--	121 (79%)
...improve their confidence.	--	--	121 (79%)
...see that they can work in a team to create something with little direction from a teacher.	--	--	111 (73%)
...improve their writing skills.	67 (84%)	--	111 (73%)
...improve their time management skills.	68 (85%)	78 (77%)	107 (70%)
...learn to be a better citizen.	66 (83%)	--	102 (67%)
...feel empowered to make changes in their own community.	--	--	76 (50%)

Note: For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

³⁴ We combined the items into a single “impact” scale to determine how reliable it was. The items formed a highly reliable scale (Cronbach’s alpha = .94).

Additional Comments

One mentor contacted CEG directly after completing the survey to share additional thoughts:

I was the mentor; I don't know of "other STEM activities" that the students pursued after the Future City competition. I did NOT see an increased interest in engineering as a result of the Future City involvement.

The students I had on the team, I viewed as the top 20% of middle school students (7th grade) in the country. While that sounds like a dream team, the demands on their time were already very high (sports, school, religious involvement, and family activities). At least two went on to play high-level high school sports (basketball and soccer), one achieved a Tae Kwon Do Black Belt soon after the competition ended, and one will likely play collegiate soccer on a scholarship. In short, life was already in high gear for these students. Future City was for the most part more than they had time to address. Not that they did poorly -- they did finish second in the district (multi-state) competition. However, they were blocked by-rule from advancing to higher-level competition because the top team in the district was from the same school. After struggling to juggle schedules and prepare for the competition, this was a kick in the teeth to the students, the parents, and the school principal that had, from a distance, monitored the team's challenges to prepare -- always, time crunches. Watching the by-far inferior teams present at the FC competition outbrief -- teams that did advance -- it hurt.

So, in the end, were there benefits? Probably; probably big, long-term benefits in team building experience and gaining respect for the time commitment it takes to pull together a major project. Despite probable long-term, intangible benefits, I'm sure that in the short-term, the students and all parents would say, it was painful -- working so hard to coordinate schedules, placing so well at district, going home empty handed because of a rulebook. In summary, Future City was hard work, likely had long-term positive impacts, and delivered some trauma.

Judges

Satisfaction

We asked judges to report on the extent to which Future City met their expectations. Consistent with prior years, most judges reported that **Future City fully met or exceeded their expectations** (91%). This is higher than the proportion that reported this in 2016 (84%).

Table 47:
Degree to Which Judges Expectations were Met

	2016 Total	2020 Total
	N = 491	N = 389
Exceeded expectations	118 (24%)	86 (22%)
Fully met expectations	294 (60%)	270 (69%)
Partially met expectations	58 (12%)	30 (8%)
Did not meet expectations	3 (1%)	3 (1%)
Missing	18 (4%)	0 (0%)

We asked judges whether they would recommend Future City to their colleagues. Nearly all (98%) reported that they would recommend it, 2% reported that they might, and only one judge reported that they would not recommend it.

Table 48:
Proportion of Judges Who Would Recommend Future City

	2020 Total
	N = 389
Yes	380 (98%)
Maybe	8 (2%)
No	1 (1%)

Nearly all judges (95%) reported that they **would participate again**. Most judges also reported that they now feel like they are **part of a Future City community** (79%). Nearly all judges (92%) agreed or strongly agreed that **Future City represents the field of engineering**.

**Table 49:
Judge Satisfaction**

	2020 Total
	N = 389
I would participate in Future City again.	369 (95%)
As a judge, I feel like I am part of a Future City community.	307 (79%)
Future City represents the field of engineering.	356 (92%)

Note: These questions are new for 2020.

Workload

Most judges reported that the Future City workload was appropriate for them (91%), but a smaller proportion reported that the amount of work was appropriate for students (74%). This echoes findings from mentors in 2020. Despite the amount of work, nearly all judges reported that **Future City was challenging for students and that it was worth the effort**. Only 36% of judges reported that Future City was challenging for them.

**Table 50:
Judge Perceptions of Appropriateness of Workload**

	2020 Total
	N = 389
The amount of work Future City required was appropriate for the students.	287 (74%)
The amount of work Future City required was appropriate for me.	354 (91%)
Future City was challenging for the students.	347 (89%)
Future City was challenging for me.	141 (36%)
Future City was worth the effort.	370 (95%)

Note: These questions are new for 2020.

Appreciation for Engineers and Engineering Work

Nearly all judges (90%) reported that Future City helped students **see that engineers can be helpful to society**. Most also reported that it helped students **see a connection between their own interests and a career in engineering** (82%). Most judges (72%) also reported that Future City helped students **picture themselves working as engineers someday**. Finally, most judges (78%) reported that Future City helped students **think about future careers**.

Table 51:
Judge Reports on Student Appreciation for Engineering and Engineering Knowledge

	2020 Total N = 389
<i>Future City helped my students...</i>	
...see that engineers can be helpful to society.	351 (90%)
...see a connection between their own interests and a career in engineering.	320 (82%)
...picture themselves working as an engineer someday.	279 (72%)
...start to think about future careers.	302 (78%)

Note: These questions were new for 2020.

Sense of Community

We asked judges to report on the degree to which students felt like part of the Future City community—74% reported that the students they observed **did feel like part of a community**.

Table 52:
Judge Reports on Student Sense of Community

	2020 Total N = 389
<i>Future City helped students...</i>	
...feel like they are part of the Future City community.	289 (74%)

Note: This question was new in 2020.

Impact on Skills and Knowledge

Most judges reported that Future City had a positive impact on the students they met across a number of different areas (see table below). Eighty percent or more of judges agreed or strongly agreed that Future City helped students:

- Feel a sense of accomplishment about being part of Future City.
- Learn how to plan a project.
- Improve their ability to work with a team.
- Improve their problem-solving skills.
- Learn about how cities work.
- Improve their research skills.
- Improve their public speaking skills.
- Learn how to break down a project into manageable parts.
- Learn how to use engineering to solve real world problems.
- Improve their confidence.

These same observations were made by educators and mentors, who also listed these items above as the top impacts they observed.

Table 53:
Judges Perceptions of Impact on Students³⁵

	2020 Total
	N = 389
<i>Future City helped students...</i>	
...feel a sense of accomplishment about being part of Future City.	347 (89%)
...learn how to plan a project.	346 (89%)
...improve their ability to work with a team.	344 (88%)
...improve their problem-solving skills.	341 (88%)
...learn about how cities work.	336 (86%)

³⁵ We combined the items into a single “impact” scale to determine how reliable it was. The items formed a highly reliable scale (Cronbach’s alpha = .91).

	2020 Total
	N = 389
<i>Future City helped students...</i>	
...improve their research skills.	326 (84%)
...improve their public speaking skills.	325 (84%)
...learn how to break a project down into manageable parts.	322 (83%)
...learn how to use engineering to solve real world problems.	318 (82%)
...improve their confidence.	315 (81%)
...learn how to apply math and science to real world problems.	301 (77%)
...learn about the engineering design process.	287 (74%)
...improve their time management skills.	282 (73%)
...improve their writing skills.	265 (68%)
...learn to be a better citizen.	264 (68%)
...see that they can work in a team to create something with little direction from a teacher.	261 (67%)
...feel empowered to make changes in their own community.	228 (59%)

Note: These questions were new for 2020. For readability purposes, we have only included the total sample size at the top of each table rather than including the number of valid responses for each question. Percentages were computed based on the number of valid responses for that question and not the total sample size.

Regional Coordinators

Motivation to Lead

We asked Regional Coordinators to tell us about their motivation for taking on this leadership role. Some told us that they were encouraged to fill a role that was vacant:

- *The previous coordinator retired and we wanted to keep the program going in our state because we believe it is an important program to offer.*
- *There was a sudden need and no one else stepped up. So I did.*
- *Future City has played an important role in my son's education and career choices. It also has done great things for the students at my school over many years. So when the previous RC resigned and no one stepped up to the plate, it seemed like a natural thing to do to keep this program [going].*
- *Previous Coordinator moved suddenly and I had the most time to commit of other members.*
- *There was no official region in my state when I retired here full time in 2012. I had been part time from early 2000. The previous coordinators abandoned their Future City region mid-program. This was driven by the "great recession" at that time. I had volunteered as a judge twice. When I settled here full time, it seemed unbelievable that there was no Future City in our state. We have so many technical people and companies, and companies have a tough time finding engineers. Also, we had the premier Engineering schools here. I first tried to bring in a school where I volunteer as a mentor in their Girls in STEM program to help me, but they declined. After that, and with some guidance from a retired Foundation Executive, I set up a BOD, not-for-profit status etc. In our state, you cannot solicit funds without being "an official" not-for-profit.*

Others came to their roles after participating in Future City in other capacities:

- *My involvement in Future City started in 2011 when my daughter was a competitor at nationals. Then I assisted the teacher in our school at the regionals and nationals. This year I was asked to be the activities coordinator. I volunteered to accompany the*

Regional Coordinator to DC. Unfortunately, she was ill and couldn't attend. I learned so much being on the other side of this amazing organization.

- *I became involved as a member of the leadership committee after the first year of involvement as I was looking for a way to move the program forward and ensure it was sustainable.*
- *I believe that this program is very effective at reaching students. I wanted to help beyond the school that I mentor.*
- *Initially, I thought my son would be interested due to his interest in SimCity, but he wasn't. I was also involved with our local Engineers Week Committee, which was interested in sponsoring it.*

Others simply told us that they just love Future City and that it was a natural fit for them:

- *Future City is one of many competitions and events we run. As a company, we love seeing the students think like engineers and create cities of the future. I love how the students focus on finding solutions to real world problems.*
- *I really believe in the Future City program. I think this program not only encourages STEM awareness but also teaches real life skills. The SimCity component is crucial in teaching budgeting skills and gets students looking at the financial aspects of running a city in a very concrete way. You can't fund the police force if you don't charge any taxes....*
- *I love Future City and how there is such a spectrum of kids it touches instead of a very specific group. [When I was young] I was told I couldn't be an engineer or do STEM so I don't want [other kids to have that same experience].*
- *I love the program and seeing the students learn about how cities function.*
- *Give back to the community and support STEM activities.*
- *I have an education background, and I think FCC is an excellent learning experience.*
- *I am an avid supporter of the ideals of the Future City program.*
- *I feel confident that going forward we will grow. My aim is to grow to 30 teams at Regionals.*
- *It is a nice program and I believe it inspires kids to use their creativity to learn about engineering.*

We asked Regional Coordinators what they most enjoyed about their roles. Some reported that they are inspired by the students and the work that they accomplish:

- *Seeing the students on competition day.*
- *I love working with the teachers and the students! It's amazing to see how middle school students are thinking like engineers. I love watching how they develop and grow throughout the process.*
- *Working with the kids and seeing how creative they can be.*
- *Helping teachers, see the teams' deliverables, coming together at the final competition. Student confidence. Seeing the engineering community support this.*
- *Seeing the excitement of students at the competition (both before and after), especially those that major in engineering at the college where I work.*

Others enjoyed having an impact on students' lives:

- *Playing such a key role in a competition that may change the trajectory (for the better) of the life of a child.*
- *I like being able to support the educators and the students. I like being able to engage business and city leaders with successful teams. I like creating the opportunity for students to look at their own communities and know they can make a positive impact.*
- *Helping teachers and seeing students learn new things.*

Some enjoyed meeting with and working with others:

- *Volunteering and meeting other coordinators and watching all of the teams present.*
- *Meeting and working with a variety of people: judges, sponsors, educators and students.*
- *The interaction with the many personnel that make it happen, this is the sponsors, mentors, educators, volunteers, and students. This is the only role that awards me with the opportunity to work with members of each of these.*
- *I get to maintain contact with the educational community after my retirement. The networking, the new friends, learning about different places in our state, and how excited the students and adults (volunteers, judges, etc.) are about the competition. I also love how people now come forward to help.*

Others enjoyed planning and hosting the competition events:

- *Organizing and hosting the event itself.*
- *Setting up the event and seeing all the positive feedback. We have a great committee so it's making my role as regional coordinator easier.*
- *Being involved in coordinating the different aspects of the regional competition. Reaching out to teachers and other volunteers to make the program work.*
- *I enjoy helping make this program work.*

We also asked Regional Coordinators what they *don't* like about their roles. Some pointed to logistical and administrative challenges:

- *Keeping track of the many details and emails that need to go to the educators. Snowstorms that inevitably cause us to reschedule everything. Needing to read through all of the rules to find the information to point the educators to.*
- *Worrying like a wedding planner about whether my judges, volunteers, and caterer will show up, and whether the A/V and scoring system will work on the day of competition.*
- *The number of webinars/calls to coordinate or keep up with. With this being a volunteer position, it's difficult to keep up with (although, they do provide good information).*
- *The initial login experience is never easy.*
- *Trying to get teachers to reply to emails with information about mentors, program information, shirt sizes, etc.*
- *Teachers who do not give names and information when requested, the online media waivers this year were a problem for us.*
- *It is difficult to run the competition away from a big metropolitan area and not have the support of a work-related company, as I am retired. Since I retired here, I have had to develop a new network. My most frustrating part is CMS and the lack of announcing the topic earlier. Last year the topic was formally announced in May, far too late for teachers to think about joining. The clumsiness of CMS causes problems. Corrupted files, the lateness of initiating the Media Waivers (this year), no emails to people when they log in, the need to "match" judges to rooms, caused lots of issues. However, I want to note, that I could not run Future City without CMS.*

- *I know NCEES gives money and an award to each Future City region, but it would be really nice if they provided judges and their check (\$) more promptly.*

Others mentioned specific deliverables or the number of deliverables as problematic:

- *The virtual city deliverable made the competition very difficult. I'm so glad it's not a deliverable this year. Our schools had lots of technology issues. I also hope the deliverable is not replaced. One thing we constantly hear is that the competition has too many deliverables. As a former educator, I think teachers already have so much on their plate that the competition did need to be condensed some. Five deliverables on top of everything else the students are involved in is a little too much.*
- *Trying to help teachers with SimCity when it won't work on their school computers.*

Some simply wished for more time to get their work done or to have a paid position instead of a volunteer one:

- *I wish I had more time and experience.*
- *I wish I had more time to spend doing it and that it wasn't just a volunteer role. It would make it easier to get all the ideas going faster and I think we could grow the region better. I have a co-coordinator that doesn't do anything and sometimes actually spreads misinformation because he doesn't participate in the webinars, etc.*
- *It basically takes over my life for several weeks before the competition as I've ended up with too many roles (too long a backstory on that).*

Some lamented that they needed to do fundraising as part of their roles:

- *Fundraising can be challenging.*
- *Fundraising as Regional Coordinator is the least enjoyable portion as competition as we have to redevelop the relationship each year with the new foundation-based funding models.*
- *Fundraising [is the biggest problem].*

We asked Regional Coordinators, “What could FC (Future City) headquarters do to help you do your job effectively? Are there additional resources that you need?”

Some did not have any suggestions, but wanted to share their satisfaction with FC headquarters:

- *I feel very supported by FC HQ.*
- *You guys are the best and doing everything already and more to support me. I am not sure what else there is to ask of you.*
- *FC Headquarters is AMAZING. Very helpful, very organized, and very encouraging. Shout out to Jake and to Maggie who have worked tirelessly to help establish our region answering hundreds of my questions ;-).*
- *I believe FC headquarters is providing sufficient resources. We're in the process of using them to grow our region.*
- *Will think but as of now nothing as doing great!*
- *The monthly calls and topic-specific webinars are excellent. The brochures and other printed and web resources are also very good.*
- *I want to thank Jake for his help. He is unbelievable, and answers my complaints and other questions (some inane) respectfully and promptly!*

Others had specific suggestions related to online tools:

- *Email templates with information that should be filled in and timing (relative to the competition or other reference point) to send to educators.*
- *Make the login seamless when switching between regional and national sites.*
- *Have a CMS that wasn't so glitchy and created so many problems. It is getting better, but still a problem. Don't spring things like having to match parents and students for the media waivers on us; I understand that will change for next year, but be more careful what you ask the regions to do.*
- *Having to link the media waivers was a LOT of work on the coordinators at the last minute. There needs to be an easier system to do this.*

Others suggested changes to the timelines:

- *It would help to move the timeline for sending the graphics, trophies, etc. up by one week or so. Some of my committee members and schools feel that we lose time during the holiday break. So regionals in March and finals in April would be better.*
- *Please have the online waivers, or anything else, up and running in time for us to use it effectively.*
- *We need to announce the topic earlier. Schools are so busy and only the more flexible schools, such as charter schools, private academies, and home schools, have the potential to join if we are late announcing the topic. Also, I often wonder who makes the decisions as to topics, schedules, etc.? Why not have a Steering Committee of Regional Coordinators? Should we have an equal amount of educators and engineers on a Steering Committee?*

Some had suggestions about deliverables and requirements:

- *Don't replace virtual city.*
- *We should have had a replacement for SimCity immediately. Just how many years have we been talking about this? Chrome books in schools and privacy issues are not new.*
- *We need to address the NGSS standards more in detail.*
- *We should drop the \$25 requirement. It does not do anything.*
- *The problem of non-background-checked adults working with juveniles has not been addressed. All we have to do is when a volunteer/judge signs on into CMS is to make them sign an affidavit attesting/agreeing to a background check, or that they comply with a Future City code of conduct. It should be a global requirement and Future City should budget for background checks.*

Others requested help with fundraising, recruiting, or other administrative tasks:

- *I wish there was a guide to becoming an individual organization because I am trying to take it from BSCES since they can't possibly continue to fund it as it grows. This year we will stay under them but get sponsorship to demonstrate we can go on our own.*
- *More choices in the group-buy for things to give away to students.*

- *Fundraising document language examples for this like the program's mission statement that is across the board (all regions). This would allow for a larger corporate sponsorship opportunity as multiple applications show the same info.*
- *More help marketing to attract mentors. And more teacher webinars.*

One coordinator raised concerns about scoring:

- *I believe that there needs to be more score transparency. Schools should know the high score in each category to compare to their own so they know where they need to improve. The current scoring info results in the same schools succeeding each year.*

We asked Regional Coordinators to share any evidence (even anecdotal) that Future City is successful at engaging kids in engineering. They told us:

- *Being involved on the school level and being an educator I am able to see first-hand how past students who were members of Future City take the knowledge from the STEM competition and put it into the real world. Quite a few of these students have become engineers and others practice public speaking on a daily basis. Future City provided them with many skills they will use in the real world.*
- *I have heard several students say they didn't know there were so many types of engineers. I think this competition opens new doors for students and provides insight into STEM careers--especially engineering.*
- *All my Future City alumni are serving as event volunteers at the Regional Competition and they are taking engineering at their high schools and colleges.*
- *Many teachers have commented to me that this is a great benefit since it gives their students early awareness of the next step. In other words, they introduce engineering concepts in their classrooms with Future City and then they compete in an environment where kids can see themselves as taking the next step to solving problems and earning a degree in engineering. (Plus our engineering judges are AWESOME! I want to go back to school to study engineering!!! ;-))*
- *This past year I had a teacher tell me that she was using the program with her IEP (Individual Education Plan) students. It got off to a rough start, but then, by the end, the students were eager to learn, completing research on their own, and excited about*

competing in the competition. They came to the competition prepared and did a great job. This program is for all levels of students, not just for HAL/Gifted students.

- *Future City has success at engaging students in engineering as seen by the alumni that come back as volunteers and are connected to the program on social media who are working professionals.*
- *The number of students that we know that are majoring, or have majored, in engineering and go on to careers based on LinkedIn and Facebook tracking.*
- *Over my 16 years as a teacher/adviser, I have had many students enter the field of engineering from this experience. Even more, my students have become conscious of the issue of the Earth's sustainability.*
- *I know from my work as a mentor it was obvious that the schools don't emphasize STEM careers as an option, especially in under-represented schools. I know we have several alumni who took a turn into engineering because of Future City.*
- *I have multiple students who have gone on to careers in engineering.*
- *Two people on my committee were former participants when they were young.*

Finally, we asked Regional Coordinators if they had any other suggestions for enhancing the Future City program. They offered the following:

Several commented on SimCity:

- *Decide on a replacement for SimCity asap. Even if a virtual model is not scored, require that the same software be used by all participants as it helps to level the playing field and enforce some ground truths about city planning.*
- *If you want to keep participation, do not replace the virtual city deliverable. The competition had too many things that were always due and most of the kids are already involved in many other events. Too many deliverables causes them to lose interest.*
- *The virtual city is really making it hard for some participants. I think finding an updated version would be beneficial.*
- *Make virtual city more about the city instead of the PowerPoint presentation.*
- *Build a more robust project plan deliverable as engineering and project management work hand in hand. This is a skill set that would be a great to advance.*

- *Ensure we bring in a good computer system to replace SimCity as that is a huge benefit to city planning understanding.*
- *A tech component that all schools can use easily no matter what kind of device students are using. An art-focused deliverable option (drawing, diagram, etc.).*

Others suggested needing more support for teachers and teams, especially those that do not compete:

- *We are looking for better ways to engage non-competing teams to celebrate their work and encourage them to compete the next year. This year was the first year that we invited these teams to come show off their models, but we didn't have structure beyond that. Any additional ideas would be great.*
- *We should promote Future City as one of the oldest STEM programs for students. There are so many STEM and STEAM 'days' now. Future City is an amazing program but it is not easy for the educator. It is not a 'babysitting', hands-on-for-2-hours program; it requires teamwork, schedules, etc. And, we should honor the educators for their work.*
- *We need something more concrete for teachers after the Regional. We drop the ball by not having some sort of "continue the process" program to bring it into the next school year.*
- *More teacher support especially for new teachers.*

Some mentioned scoring issues:

- *I believe that there needs to be more score transparency. Schools should know the high score in each category to compare to their own so they know where they need to improve. The current scoring info results in the same schools succeeding each year.*
- *Reduce the number of judging elements in the rubrics. The judges are overwhelmed with how much they have to look at and score in a very limited time.*

Finally, one coordinator requested support for paid help:

- *If there would be a way to write a national grant that would allow for some paid help at the state level, that would be great. A designated person whose position would be to*

promote Future City in the schools, afterschool programs, among homeschooled students, etc., personally would go a long way.



Summary

This section highlights the main findings.

Satisfaction

Overall, participants reported high levels of satisfaction with Future City in 2020.

Most adults reported that Future City met or exceeded their expectations this year, including:

- 91% of judges
- 84% of parents
- 84% of educators
- 76% of mentors

Participants felt a sense of accomplishment being a part of Future City, according to:

- 87% of students
- 90% of educators
- 85% of mentors

Participants would participate again, if they could, according to:

- 95% of judges
- 90% of mentors
- 89% of educators
- 75% of students

Most participants would recommend Future City to others, including:

- 98% of judges

- 92% of mentors
- 90% of parents
- 90% of educators

Mentors and judges reported that Future City represents the field of engineering:

- 92% of judges
- 91% of mentors

Workload

Overall, participants reported that Future City was challenging and rewarding.

Most participants reported that Future City was challenging *and* worth the effort:

- 95% of educators reported that it was challenging for their students, 82% reported it was challenging for themselves, and 90% reported that it was worth the effort.
- 91% of mentors reported that it was challenging for their students, 61% reported it was challenging for themselves, and 90% reported that it was worth the effort.
- 89% of judges reported that it was challenging for students, 36% reported it was challenging for themselves, and 95% reported that it was worth the effort.
- 68% of students reported that it was challenging and 87% reported that it was worth the effort.

The workload was appropriate for adults, but may have been a bit too much for some students, according to:

- 35% of educators
- 32% of mentors
- 26% of judges

Most participants reported that presenting ideas to the judges was worthwhile, according to:

- 79% of students
- 88% of educators
- 88% of mentors

Appreciation for Engineers and Engineering Work

Most participants reported that Future City had a significant impact on students’ appreciation for engineering. Students reported smaller impacts on their future plans—likely because the sample skewed young and they probably aren’t thinking seriously about careers yet. The table below summarizes the proportion of each group who reported that Future City impacted students’ appreciation for engineers and engineering work:

**Table 54:
Student Appreciation for Engineers by Subgroup**

<i>Student wording</i>	Students	Parents	Educators	Mentors	Judges
	N = 1,560	N = 798	N = 427	N = 152	N = 389
<i>Future City...</i>					
... helped me see that engineers can be helpful to society.	1323 (85%)	660 (82%)	392 (92%)	147 (96%)	351 (90%)
... helped me appreciate all the engineering that goes into a city.	1318 (85%)	--	--	--	--
... helped me see the value in working with a team to solve problems.	1277 (82%)	--	--	--	--
... helped me see that math and science are important to my future.	1188 (76%)	--	--	--	--
... helped me find an outlet for my creativity and imagination.	1165 (75%)	--	--	--	--
... helped me appreciate the importance of civic issues like politics and taxes.	918 (59%)	--	--	--	--
... helped me see a connection between my own interests and a career in engineering.	711 (46%)	519 (64%)	360 (84%)	131 (86%)	320 (82%)
... made me interested in doing other engineering clubs or activities.	696 (45%)	--	--	--	--
... started me thinking about future careers.	604 (39%)	444 (55%)	317 (74%)	111 (73%)	302 (78%)

<i>Student wording</i>	Students	Parents	Educators	Mentors	Judges
	N = 1,560	N = 798	N = 427	N = 152	N = 389
<i>Future City...</i>					
...helped me picture myself working as an engineer.	572 (37%)	428 (53%)	329 (77%)	119 (78%)	279 (72%)

Sense of Community

Most participants reported that they felt like part of a Future City community, according to:

- 79% of educators
- 79% of judges
- 75% of mentors
- 70% of students
- 68% of parents' reports about their children

Most students reported that they believed that were supportive professionals in the field who can help them become engineers if they want (71%).

Impact on Skills and Knowledge

All participants reported observing impacts on students' skills and knowledge as a result of participating in Future City. Consistently, across subgroups, participants reported impacts on students':

- Ability to work with a team (including without the help of a teacher),
- Ability to plan a project,
- Knowledge of how cities work,
- Problem-solving skills, and
- Understanding of how to use engineering to solve real-world problems.

The Top 3 impacts are highlighted in green in the table below.

**Table 55:
Impact on Student Skills and Knowledge by Subgroup**

<i>Student wording</i>	Students	Parents	Educators	Mentors	Judges
	N = 1,560	N = 798	N = 427	N = 152	N = 389
<i>Future City...</i>					
... taught me that I can work in a team to create something with little direction from a teacher.	1241 (80%)	646 (80%)	341 (80%)	111 (73%)	261 (67%)
... helped me improve my ability to work with a team.	1222 (78%)	658 (81%)	365 (86%)	130 (85%)	344 (88%)
... helped me learn how to plan a project.	1195 (77%)	660 (82%)	374 (88%)	126 (82%)	346 (89%)
... helped me learn how cities work.	1192 (76%)	682 (84%)	383 (90%)	137 (90%)	336 (86%)
... helped me learn how to break a project down into manageable parts.	1156 (74%)	643 (80%)	367 (86%)	121 (79%)	322 (83%)
... helped me learn about the engineering design process.	1150 (74%)	648 (80%)	378 (89%)	127 (83%)	287 (74%)
... helped me improve my problem-solving skills.	1142 (73%)	636 (79%)	381 (89%)	129 (84%)	341 (88%)
... helped me learn how to use engineering to solve real-world problems.	1120 (72%)	646 (80%)	380 (89%)	137 (90%)	318 (82%)
... helped me learn how to apply math and science to real-world problems.	1076 (69%)	634 (79%)	379 (89%)	128 (84%)	301 (77%)
... helped me improve my time management skills.	1048 (67%)	552 (68%)	345 (81%)	107 (70%)	282 (73%)
... helped me improve my research skills.	1019 (65%)	607 (75%)	363 (85%)	123 (80%)	326 (84%)
... helped me improve my public speaking skills.	978 (63%)	547 (68%)	362 (85%)	124 (81%)	325 (84%)
... improved my confidence in myself.	912 (59%)	597 (74%)	346 (81%)	121 (79%)	315 (81%)
... helped me feel empowered to make changes in my own community.	833 (53%)	486 (60%)	288 (67%)	76 (50%)	228 (59%)
... helped me improve my writing skills.	658 (42%)	495 (61%)	320 (75%)	111 (73%)	265 (68%)
... helped me in my other classes.	615 (39%)	--	--	--	--
... helped me learn to be a better citizen.	--	581 (72%)	322 (75%)	102 (67%)	264 (68%)

Consistently, the bottom three impacts were on students’:

- Feelings of empowerment to make changes in their own communities,
- Performance in other classes, and
- Understanding of how to be a better citizen.

These are areas that DiscoverE may want to focus on more heavily in the future. These are highlighted in red in the table above.

Findings Over Time

Finally, as noted earlier, student appreciation of engineering and impacts on students’ skills and knowledge trended downward from 2014 to 2020. To explore the question of why so many of these items trended downward over time, we first looked for any major differences in the composition of the samples over time. One major difference we noted was that the 2020 sample was younger than samples from prior years. So, we next looked at the correlation between student grade and appreciation as well as student grade and the impacts on skills and knowledge. We found positive and statistically significant correlations each time. **Thus, it appears that the differences over time in appreciation scores are likely due, in part, to the younger age of the sample in 2020 versus prior years.**

Another factor that we found weighed heavily on student appreciation, skills, and knowledge was whether students had the consistency of a full-time mentor this year. In cases where teams had a full-time, consistent mentor, students had greater appreciation for engineers and the work engineers do and we observed more significant impacts on students’ knowledge and skills. **Thus, this study found that mentors matter greatly to the success of Future City.**

Overall, the evaluation study found that Future City had a significant impact on participants across the board. Participants were satisfied, felt like they were part of a community, were able to accomplish something challenging, developed a greater appreciation for engineering, and gained some new skills and knowledge. In addition to describing these findings in greater detail, this report includes suggestions for enhancing the Future City program.