

Concord Evaluation Group

Future City 2013-14: Evaluation Report

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Table of Contents

Background	1
Study Design	3
Participants.....	4
Sample Sizes.....	4
Students.....	6
Parents	11
Educators.....	13
Mentors.....	19
Findings.....	23
Students.....	23
Parents	30
Educators.....	33
Mentors.....	38
Summary	42
Appendix A: Student Survey	A-1
Appendix B: Parent Survey	B-1
Appendix C: Educator Survey	C-1
Appendix D: Mentor Survey	D-1

Background

DiscoverE (formerly National Engineers Week) hired Concord Evaluation Group (CEG) to conduct an independent evaluation of the Future City program (<http://futurecity.org>). Future City has been operating since 1992. According to DiscoverE, the Future City program is “a national, project-based learning experience where students in 6th, 7th, and 8th 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.”



Winners of the 2014 Competition: St. John Lutheran School, Michigan

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.

CEG conducted an evaluation of Future City in 2012 to assess the degree to which Future City has achieved these objectives. This report summarizes a second wave of evaluation data collected in 2014. When appropriate, this report provides comparisons of the data collected in 2012 with the data collected in 2014.

Study Design

Concord Evaluation Group (CEG) conducted an evaluation study to learn about the event’s impact on students as well as to discover ways to enhance Future City for future implementation. In addition to exploring the program’s impacts, with this study we also had an opportunity to explore potential differences between students who compete at their Regional competitions only versus students who make it to the National competition.

In collaboration with DiscoverE, CEG developed four surveys to collect feedback from students, parents, educators, and engineer mentors. These data collection instruments are included in the Appendix. As explained earlier, CEG conducted a similar evaluation of Future City in 2012. Thus, most of the questions used in 2012 were also included in the 2014 instruments in order to explore possible changes over time.

We invited participants from the 37 regions listed in Table 1 to participate in the 2014 evaluation.

**Table 1:
Future City Regions**

West	Midwest	Northeast	South
Arizona	Great Plains	Mid Atlantic	Alabama
California-Northern	Illinois-Chicago	New England	Florida-South
California-Southern	Indiana	New Jersey	Florida-Tampa Bay
Idaho	Iowa	New York-Albany	Georgia
Nevada-Southern	Michigan	New York-NYC	Kentucky
New Mexico	Minnesota	New York-Western	Louisiana
Washington	Nebraska-	Pennsylvania-Central	North Carolina
	Omaha/Heartland	Pennsylvania-	South Carolina
	Ohio	Philadelphia	Texas-North
	Oklahoma	Pennsylvania-	Texas-Houston
	Wisconsin-Milwaukee	Pittsburgh	Texas-Central

The 2014 surveys were administered online only (which differs from the 2012 evaluation when all of the surveys were administered by paper). The surveys were optimized for responding via smartphone or computer. At each regional competition and at the national competition, participants were invited to respond to the survey. One respondent from each region won a \$50 Amazon gift card as an incentive to participate.

Methods for inviting participants varied – coordinators at some competitions distributed postcards that contained the survey invitation, including the web address (URL). At some events, the survey was announced verbally. In addition, after the competitions, email reminders were sent to educators and engineer mentors to encourage greater levels of participation.

Participants

Sample Sizes

A total of 1,334 individuals responded to the four surveys, including 559 students, 330 parents, 355 educators, and 90 mentors. The sample sizes for each region are summarized in the table below.¹ The number in parentheses next to some of the counts represents the number of individuals within that category who completed the survey at the National competition instead of the Regional competition. For example, 16 out of the 16 student respondents from Northern California responded at the National competition instead of their Regional competition, while only 1 of the 7 student respondents from Idaho responded at the National competition—the rest responded to the survey at their Regional competition.

**Table 2:
Number of Individuals Participating from Each Region
(N = 1,334)**

	Students (N = 559)		Parents (N = 330)		Educators (N = 355)		Mentors (N = 90)	
	Count	%	Count	%	Count	%	Count	%
WEST								
Arizona	21	3.8%	22 (1)	6.7%	20 (2)	5.6%	2	2.2%
California - Northern	16 (16)	2.9%	4	1.2%	9 (2)	2.5%	1	1.1%
California - Southern	0	0.0%	3 (1)	0.9%	3	0.8%	0	0.0%
Idaho	7 (1)	1.3%	9 (1)	2.7%	13	3.7%	3 (1)	3.3%
Nevada - Southern	10 (3)	1.8%	9 (2)	2.7%	6 (1)	1.7%	1	1.1%
New Mexico	24 (2)	4.3%	8 (1)	2.4%	10 (2)	2.8%	1	1.1%
Washington	22 (1)	3.9%	3 (1)	0.9%	7 (1)	2.0%	2	2.2%
MIDWEST								
Great Plains	21 (1)	3.8%	7	2.1%	13 (1)	3.7%	4	4.4%
Illinois – Chicago	24 (1)	4.3%	21 (3)	6.4%	12 (1)	3.4%	5 (2)	5.6%
Indiana	54	9.7%	7 (2)	2.1%	8	2.3%	3	3.3%
Iowa	17 (1)	3.0%	15	4.5%	10 (2)	2.8%	1 (1)	1.1%
Michigan	2	0.4%	2 (1)	0.6%	9	2.5%	3	3.3%
Minnesota	7 (6)	1.3%	12 (2)	3.6%	10 (1)	2.8%	5 (1)	5.6%
Nebraska - Omaha/Heartland	1 (1)	0.2%	1	0.3%	3	0.8%	0	0.0%
Ohio	9 (3)	1.6%	8 (2)	2.4%	8	2.3%	5 (1)	5.6%
Oklahoma	6 (3)	1.1%	4	1.2%	4 (2)	1.1%	3	3.3%
Wisconsin - Milwaukee	39	7.0%	7	2.1%	18	5.1%	7 (1)	7.8%

¹ In cases where an individual completed a survey twice (once at their Regional competition and once at the National competition) we deleted their Regional survey and kept their National survey, as the National survey was completed later than the Regional one and the individuals therefore had more experience to draw upon for their responses.

	Students (N = 559)		Parents (N = 330)		Educators (N = 355)		Mentors (N = 90)	
	Count	%	Count	%	Count	%	Count	%
NORTHEAST								
Mid Atlantic	24 (4)	4.3%	8	2.4%	7	2.0%	8 (5)	8.9%
New England	16	2.9%	2	0.6%	16 (1)	4.5%	4	4.4%
New Jersey	28	5.0%	9 (2)	2.7%	12	3.4%	1	1.1%
New York - Albany	14 (5)	2.5%	9 (3)	2.7%	8 (1)	2.3%	3 (2)	3.3%
New York - NYC	10 (2)	1.8%	10 (2)	3.0%	5	1.4%	1 (1)	1.1%
New York - Western	24 (1)	4.3%	6 (2)	1.8%	7	2.0%	2 (1)	2.2%
Pennsylvania - Central	24 (6)	4.3%	15 (1)	4.5%	10 (1)	2.8%	1 (1)	1.1%
Pennsylvania - Philadelphia	14 (3)	2.5%	11 (1)	3.3%	14 (2)	3.9%	4	4.4%
Pennsylvania - Pittsburgh	19 (3)	3.4%	7 (1)	2.1%	18 (1)	5.1%	3	3.3%
SOUTH								
Alabama	2	0.4%	13	3.9%	5	1.4%	1 (1)	1.1%
Florida - South	0	0.0%	2 (2)	0.6%	5 (1)	1.4%	0	0.0%
Florida - Tampa Bay	2 (1)	0.4%	2	0.6%	11 (2)	3.1%	0	0.0%
Georgia	16	2.9%	14 (1)	4.2%	13 (1)	3.7%	1	1.1%
Kentucky	25	4.5%	14	4.2%	8	2.3%	0	0.0%
Louisiana	4	0.7%	5 (1)	1.5%	3 (1)	0.8%	2 (1)	2.2%
North Carolina	17	3.0%	39	11.8%	21 (4)	5.9%	7	7.8%
South Carolina	11	2.0%	6	1.8%	12 (1)	3.4%	0	0.0%
Texas - Central	15 (1)	2.7%	12 (1)	3.6%	7	2.0%	3	3.3%
Texas - Houston	1 (1)	0.2%	1	0.3%	2	0.6%	1 (1)	1.1%
Texas - North	13	2.3%	3	0.9%	8	2.3%	2	2.2%

Note about data collection in 2014 versus 2012

One of the secondary objectives of the evaluation was to determine the feasibility of collecting evaluation data electronically, rather than by paper and pencil, as has been done previously.

The sample sizes for educators were relatively equivalent in 2012 and 2014 (in 2012, the educator sample was 347). However, the student, parent, and mentor sample sizes in 2012, when paper surveys were used, were larger than in 2014 (in 2012, the student sample was 2,215, the parent sample was 593, and the mentor sample was 262).

More important than the raw number of individuals in a sample, however, is how representative the sample is and the degree of confidence one can have about the findings (margin of error). The table below summarizes the theoretical margins of error for each of the samples in the 2014 evaluation. As a rule of thumb, for an internal evaluation such as this, a margin of error +/- 5 points is acceptable. The sample sizes for students, parents, and educators fall within that

realm. The mentor sample size is smaller than expected and should be larger in order to reduce the margin of error from +/- 10 points.

**Table 3:
Margins of Error in 2014 Samples**

	Number in Sample	Number of Actual Participants	Margin of Error
Students	559	40,000	+/- 4 points
Parents	330	35,000	+/- 5 points
Educators	355	1,350	+/- 5 points
Mentors	90	800	+/- 10 points

Throughout the report, we have reported on the statistical significance of findings, where applicable. We should note that, in some cases, there are seemingly large differences between two groups (e.g., differences of 7% or greater) but these differences were not *statistically* significant. This lack of statistical significance is likely due, in many cases, to the very small sample sizes that existed in some sub-groups. Larger samples may have alleviated this challenge.

Recommendation for future data collection efforts

Given the much lower cost of administering surveys electronically, and the ability to gather data from samples that are sufficiently representative enough to make claims about the impact of the program on a national level, we would recommend that DiscoverE continue to offer the option of administering surveys electronically in the future.

Whether the data were representative of any specific region is an open question. Some regions had much higher response rates in 2012 than in 2014. For example South Florida had 58 respondents in 2012 and only 7 in 2014. So, it appears that paper-based surveys may be a preferred option in some regions.

Thus, based on our experience this year, we recommend that DiscoverE offer the option of paper-based *and* electronic surveys to its regions. This hybrid approach is likely to:

- Reduce the high costs of 100% paper-based administration,
- Produce sample sizes that are representative of the national population of Future City participants,
- Produce sample sizes that enable us to detect statistically significant differences between groups and sub-groups,

- Allow for regions to express their own preferences, and
- Enable the program to achieve sample sizes that are representative of specific regions, too.

Students

Student's demographic characteristics are summarized in the table below. The sample was fairly evenly split between boys (46%) and girls (43%). The proportion of students in grades 6-8 mirror those in 2012 – nearly half were 8th graders (48%), 28% were 7th graders, and 13% were 6th graders in 2014. The students who went to the National competition tended to be older: National participants were far more likely than Regional participants to be 8th graders, while Regional participants were far more likely than National participants to be 6th graders. This difference was statistically significant.²

As in 2012, most students in 2014 were in the 12 to 14 year old age range, with most reporting they were 13 years old (39%), followed by 14 year-olds (22%) and 12 year-olds (21%).

There were slightly more non-white, ethnic minorities in the 2014 sample than the 2012 sample. In 2014, 63% of students reported they were White while in 2012, 70% reported they were. Asian students remained the second most reported ethnicity (16% in 2014 and 11% in 2012). Hispanic students comprised 9% of the sample in 2014 and 10% in 2012. African-American students comprised 5% of the sample in 2014, while they were 9% of the sample in 2012.

**Table 4:
Demographic Summary**

Characteristic	Total	Regional Competitions	National Competition
	N = 559	N = 493	N = 66
Gender			
Boy	255 (45.6%)	221 (44.8%)	34 (51.5%)
Girl	242 (43.3%)	215 (43.6%)	27 (40.9%)
Missing	62 (11.1%)	57 (11.6%)	5 (7.6%)
Grade			
6th	71 (12.7%)	70 (14.2%)*	1 (1.5%)
7th	156 (27.9%)	139 (28.2%)	17 (25.8%)
8th	270 (48.3%)	227 (46.0%)	43 (65.2%)*
Missing	62 (11.1%)	57 (11.6%)	5 (7.6%)
Age			
Younger than 11	2 (0.4%)	2 (0.4%)	0 (0.0%)
11	39 (7.0%)	37 (7.5%)	2 (3.0%)
12	115 (20.6%)	108 (21.9%)	7 (10.6%)
13	217 (38.8%)	183 (37.1%)	34 (51.5%)
14	124 (22.2%)	108 (21.9%)	16 (24.2%)

² Chi-square (df = 4) = 19.927, p = .012.

Characteristic	Total	Regional Competitions	National Competition
	N = 559	N = 493	N = 66
Older than 14	2 (0.4%)	1 (0.2%)	1 (1.5%)
Missing	60 (10.7%)	54 (11.0%)	6 (9.1%)
Race/ethnicity**			
White or European American	353 (63.1%)	312 (63.3%)	41 (62.1%)
Asian American	89 (15.9%)	75 (15.2%)	14 (21.2%)
Hispanic, Latino/a, or Spanish	51 (9.1%)	43 (8.7%)	8 (12.1%)
Black or African-American	27 (4.8%)	26 (5.3%)	1 (1.5%)
Native American or Alaskan Native	6 (1.1%)	5 (1.0%)	1 (1.5%)
Native Hawaiian or Pacific Islander	2 (0.4%)	0 (0.0%)	2 (3.0%)

* Statistically significant at the $p < .05$ level.

** Totals may add up to greater than 100% because students could pick more than one race/ethnicity.

One-quarter of programs (25%) included gifted and talented students in their Future City programs, while 8% reported including special education students. This is somewhat consistent with 2012 findings, which showed that 34% of programs included gifted and talented students and 8% included special education students.

Organizations were most likely to include 7th and 8th graders in their Future City programs (69% and 76%, respectively). These findings mirror closely the 2012 findings.

**Table 5:
Grades Included in Programs**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 324	N = 31
Sixth	140 (40.3%)	162 (45.6%)	151 (46.6%)	11 (35.5%)
Seventh	228 (65.7%)	245 (69.0%)	222 (68.5%)	23 (74.2%)
Eighth	264 (76.1%)	269 (75.8%)	246 (75.9%)	23 (74.2%)
Other (3 rd or 5 th grades)	2 (0.01%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

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

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 (in 2012, 42% reported that they were related to an engineer).

For nearly three-quarters of students (72%), 2013-14 was their first year participating in Future City (in 2012, 78% of students reported it was their first time). There was no noticeable difference between Regional and National participants with respect to the proportion of first-timers.

National participants were slightly more likely than Regional participants to have also participated in FIRST Lego League (11% versus 8%), engineering classes (18% versus 12%), and technology classes (30% versus 22%) but these differences were not statistically significant (possibly due to small sample sizes in some of the sub-groups).

**Table 6:
Prior Engineering Experiences**

Characteristic	Total	Regional Competitions	National Competition
	N = 559	N = 493	N = 66
Related to an Engineer			
Yes	211 (37.7%)	184 (37.3%)	27 (40.9%)
No	169 (30.2%)	154 (31.2%)	15 (22.7%)
Don't know	118 (21.1%)	99 (20.1%)	19 (28.8%)
Missing	61 (10.9%)	56 (11.4%)	5 (7.6%)
Participated in Future City			
This is first time	402 (71.9%)	355 (72.0%)	47 (71.2%)
This is second time	87 (15.6%)	73 (14.8%)	14 (21.2%)
This is third time	17 (3.0%)	17 (3.4%)	0 (0.0%)
Missing	53 (9.5%)	48 (9.7%)	5 (7.6%)
FIRST Lego League			
Yes, have done	48 (8.6%)	41 (8.3%)	7 (10.6%)
No, but would like to	206 (36.9%)	186 (37.7%)	20 (30.3%)
Project Lead the Way			
Yes, have done	30 (5.4%)	27 (5.5%)	3 (4.5%)
No, but would like to	194 (34.7%)	173 (35.1%)	21 (31.8%)
Engineering Classes			
Yes, have done	70 (12.5%)	58 (11.8%)	12 (18.2%)
No, but would like to	211 (37.7%)	187 (37.9%)	24 (36.4%)
Technology Classes			
Yes, have done	126 (22.5%)	106 (21.5%)	20 (30.3%)
No, but would like to	202 (36.1%)	186 (37.7%)	16 (24.2%)
Destination Imagination			
Yes, have done	29 (5.2%)	25 (5.1%)	4 (6.1%)
No, but would like to	228 (40.8%)	206 (41.8%)	22 (33.3%)

Parents

Similar to 2012, the majority of parents in our study (93%) 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 (99%) reported that they had been involved in Future City in one capacity or another. This is significantly higher than the proportion that reported being involved in 2012 (38%). This difference may be a result of the different ways the questions were asked in 2012 and 2014. In 2012, the question was open-ended. In 2014, response options (based directly on the 2012 findings) were provided and parents could choose all that were applicable.

Consistent with the 2012 findings, the majority of parents reported that they attended the competitions (88%), offered support or encouragement (81%), and provided materials or supplies (62%).

**Table 7:
Types of Parent Involvement**

	Total	Regional Competitions	National Competition
	N = 330	N = 295	N = 35
Attended the competition	289 (87.6%)	258 (87.5%)	31 (88.6%)
Offered support or encouragement	266 (80.6%)	235 (79.7%)	31 (88.6%)
Provided materials or supplies	203 (61.5%)	183 (62.0%)	20 (57.1%)
Provided transportation for team members (not just my child)	158 (47.9%)	137 (46.4%)	21 (60.0%)
Chaperoned or supervised team at the competition	112 (33.9%)	94 (31.9%)	18 (51.4%)
Provided a space for building, meeting or storing projects	96 (29.1%)	86 (29.2%)	10 (28.6%)
Shared knowledge or mentored	84 (25.5%)	74 (25.1%)	10 (28.6%)
Edited or reviewed essays	71 (21.5%)	62 (21.0%)	9 (25.7%)
Served as a mock judge to provide feedback to team	68 (20.6%)	57 (19.3%)	11 (31.4%)
Helped build models	51 (15.5%)	46 (15.6%)	5 (14.3%)
Helped the team conduct research	44 (13.3%)	40 (13.6%)	4 (11.4%)
Supervision over power tools	43 (13.0%)	40 (13.6%)	3 (8.6%)
Helped to write essays	22 (6.7%)	22 (7.5%)	0 (0.0%)

Most parents with children in the Regional competitions reported donating between 1 and 10 hours to Future City (60%), while the same proportion of parents with children in the National competition reported donating 16 hours or more to Future City (this is not surprising, given the extra time parents likely spent traveling to and preparing for the National competition). In 2012, the average number of hours that parents reported donating to Future City was 14.5 hours.

**Table 8:
Parent Involvement Hours**

	Total	Regional Competitions	National Competition
	N = 318	N = 285	N = 33
1 to 5	90 (28.3%)	87 (30.5%)	3 (9.1%)
6 to 10	91 (28.6%)	84 (29.5%)	7 (21.2%)
11 to 15	31 (9.7%)	29 (10.2%)	2 (6.1%)
16 to 20	28 (8.8%)	25 (8.8%)	3 (9.1%)
20 to 30	29 (9.1%)	25 (8.8%)	4 (12.1%)
31 to 50	22 (6.9%)	15 (5.3%)	7 (21.2%)
51 to 60	9 (2.8%)	7 (2.5%)	2 (6.1%)
61 to 80	4 (1.3%)	3 (1.1%)	1 (3.0%)
81 hours or more	14 (4.4%)	10 (3.5%)	4 (12.1%)

Educators

Most of the educators in our sample were school teachers (90%). However, a number of educators (5%) were informal or out-of-school-time educators (e.g., they were working in afterschool programs or clubs) or homeschool parents (4%).

**Table 9:
Educator Types**

	Total	Regional Competitions	National Competition
	N = 355	N = 324	N = 31
Teacher (in school)	321 (90.4%)	293 (90.4%)	28 (90.3%)
Informal educator (afterschool)	16 (4.5%)	15 (4.6%)	1 (3.2%)
Homeschool parent	15 (4.2%)	14 (4.3%)	1 (3.2%)
Missing	3 (0.8%)	2 (0.6%)	1 (3.2%)

Consistent with the 2012 findings, among the teachers (school teachers) in our sample, most reported that they taught science (43%), followed by gifted and talented education (28%). Other subject areas reported by 1-2 educators each included art, engineering, foreign language, home economics, religion, and robotics, among other subjects.

**Table 10:
Subjects Taught by Teachers**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 321	N = 293	N = 28
Science	143 (41.2%)	151 (42.5%)	140 (43.2%)	11 (35.5%)
Gifted and Talented	128 (36.9%)	100 (28.2%)	91 (28.1%)	9 (29.0%)
Math	63 (18.2%)	72 (20.3%)	65 (20.1%)	7 (22.6%)
Technology	66 (19.0%)	70 (19.7%)	60 (18.5%)	10 (32.3%)
English Language Arts	63 (18.2%)	45 (12.7%)	39 (12.0%)	6 (19.4%)
Social Studies	31 (8.9%)	35 (9.9%)	33 (10.2%)	2 (6.5%)

Note: Totals may add up to more than 100% as teachers could choose more than one subject area.

Slightly more than one-third of educators reported that this was their first year participating in Future City (38%). Overall, the average educator reported participating in Future City for 3.77 years (standard deviation = 3.62), with a range of 1 to 17 years. These findings are consistent with 2012, when educators

reported having an average of 3.45 years (standard deviation = 3.30) of experience, with a range of 1 to 20 years.

Future City Programs

The organizations included in our sample reported that they offered a range of engineering or design and build clubs/courses to students. The most common offering was technology education classes (55%).

**Table 11:
Most Common Types of Other Engineering Programs Offered**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 324	N = 31
Technology education classes	189 (54.5%)	156 (43.9%)	145 (44.8%)	11 (35.5%)
FIRST Lego	80 (23.1%)	67 (18.9%)	63 (19.4%)	4 (12.9%)
Guest engineer speakers	80 (23.1%)	86 (24.2%)	80 (24.7%)	6 (19.4%)
Engineering classes	46 (13.3%)	58 (16.3%)	53 (16.4%)	5 (16.1%)
Project Lead the Way	29 (8.4%)	39 (11.0%)	36 (11.1%)	3 (9.7%)

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

Most educators reported that between 1 and 20 students participated in Future City at their organization this year (72%). This is consistent with the 2012 finding that the median number of students participating was 12. One exception we observed is that programs that sent teams to the National competition were twice as likely as programs that only sent teams to the Regional competitions to report having 21 to 40 students participating in Future City this year.

About half of all organizations reported that they had one Future City team (49%). Most organizations reported having between one and three teams. This year, the number of teams ranged from 1 to 20, with an average of 3.35 teams per school (standard deviation = 4.39).

Educators reported sending as many as 10 teams to competitions this year.³ But, half of all organizations reported that they sent one Future City team to a competition this year (49%). The average number of teams each organization sent to competition this year was 2.14 (standard deviation = 1.80).

³ Some regions limited the number of teams that could participate in the competition from each school, while others did not.

**Table 12:
Number of Students and Teams Participating in Future City**

	2014 Total	Regional Competitions	National Competition
	N = 355	N = 324	N = 31
Number of Students per Organization			
1 to 6 students	85 (23.9%)	82 (25.3%)	3 (9.7%)
7 to 12 students	96 (27.0%)	88 (27.2%)	8 (25.8%)
13 to 20 students	75 (21.1%)	72 (22.2%)	3 (9.7%)
21 to 40 students	53 (14.9%)	43 (13.3%)	10 (32.3%)
41 to 60 students	17 (4.8%)	16 (4.9%)	1 (3.2%)
61 to 80 students	7 (2.0%)	6 (1.9%)	1 (3.2%)
81 to 100 students	5 (1.4%)	5 (1.5%)	0 (0.0%)
101+ students	6 (1.7%)	4 (1.2%)	2 (6.5%)
Missing	11 (3.1%)	8 (2.5%)	3 (9.7%)
Number of Teams per Organization			
1 team	176 (49.6%)	164 (50.6%)	12 (38.7%)
2 teams	48 (13.5%)	43 (13.3%)	5 (16.1%)
3 teams	39 (11.0%)	36 (11.1%)	3 (9.7%)
4 to 10 teams	60 (16.9%)	52 (16.0%)	8 (25.8%)
11 to 20 teams	24 (6.8%)	22 (6.8%)	2 (6.5%)
Missing	8 (2.3%)	7 (2.2%)	1 (3.2%)
Number of Teams per Organization that Went to Competition			
1 team	174 (49.0%)	158 (48.8%)	16 (51.6%)
2 teams	65 (18.3%)	62 (19.1%)	3 (9.7%)
3 teams	38 (10.7%)	35 (10.8%)	3 (9.7%)
4 teams	21 (5.9%)	19 (5.9%)	2 (6.5%)
5 teams	11 (3.1%)	10 (3.1%)	1 (3.2%)
6 or more teams	18 (5.1%)	16 (4.9%)	2 (6.5%)
Missing	28 (7.9%)	24 (7.4%)	4 (12.9%)

As summarized in the table below, most organizations offered Future City as a club (45%) or as part of a class (38%), which is consistent with findings from 2012 (see table below). Very few offered Future City as both a class and a club (6%). Notably, programs that sent teams to the National competition were more likely to offer Future City as part of a class (52% versus 36%), while programs that sent teams only to the Regional competitions were more likely than programs that sent teams to the National competition to offer Future City as a club (46% versus 29%). This difference was statistically significant.⁴

⁴ Chi-square (df = 3) = 8.066, p = 0.045.

**Table 13:
How Organizations Offered Future City**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 324	N = 31
As a club	181 (52.2%)	159 (44.8%)	150 (46.3%)	9 (29.0%)
Part of a class	168 (48.4%)	134 (37.7%)	118 (36.4%)	16 (51.6%)
Both	22 (6.3%)	50 (14.1%)	47 (14.5%)	3 (9.7%)
Missing	0 (0.0%)	12 (3.4%)	9 (2.8%)	3 (9.7%)

Note: In 2012, the total may add up to more than 100% as educators could choose more than one option.

Most programs offered Future City after school (48%). One-third of programs (33%) offered Future City during school hours, which is a decrease from 2012, when 41% of Future City groups reported meeting during school hours.

**Table 14:
When Organizations Offered Future City**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 324	N = 31
Mostly after school hours	148 (42.7%)	169 (47.6%)	156 (48.1%)	13 (41.9%)
Mostly during school hours	142 (40.9%)	117 (33.0%)	107 (33.0%)	10 (32.3%)
Equally during and after school	53 (15.3%)	54 (15.2%)	49 (15.1%)	5 (16.1%)
Missing	4 (1.2%)	15 (4.2%)	12 (3.7%)	3 (9.7%)

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, 44% of educators reported that the students dedicated between 21 and 60 hours to Future City. This is consistent with the median number of hours reported in 2012 (median = 50 hours).

For Future City students who *did not* attend a competition, 49% of educators reported that students worked fewer than 40 hours, consistent with the 2012 finding that the median number of hours that non-competing students worked was 35 hours.

More than one-third of educators (37%) reported that they worked between 41 and 80 hours on Future City this year. Another 29% reported that they worked

more than 81 hours this year, while roughly another third of educators (30%) reported that they worked fewer than 40 hours on Future City this year.

**Table 15:
Number of Hours Dedicated to Future City**

	2014 Total	Regional Competitions	National Competition
	N = 355	N = 324	N = 31
Students Who DID Go to Competition			
Fewer than 20 hours	15 (4.2%)	13 (4.0%)	2 (6.5%)
21 to 40 hours	71 (20.0%)	65 (20.1%)	6 (19.4%)
41 to 60 hours	84 (23.7%)	81 (25.0%)	3 (9.7%)
61 to 80 hours	66 (18.6%)	63 (19.4%)	3 (9.7%)
81 to 100 hours	38 (10.7%)	34 (10.5%)	4 (12.9%)
101+ hours	54 (15.2%)	44 (13.6%)	10 (32.3%)
Missing	27 (7.6%)	24 (7.4%)	3 (9.7%)
Students Who DID NOT Go to Competition			
Fewer than 20 hours	101 (28.5%)	91 (28.1%)	10 (32.3%)
21 to 40 hours	74 (20.8%)	70 (21.6%)	4 (12.9%)
41 to 60 hours	45 (12.7%)	44 (13.6%)	1 (3.2%)
61 to 80 hours	33 (9.3%)	27 (8.3%)	6 (19.4%)
81 to 100 hours	13 (3.7%)	10 (3.1%)	3 (9.7%)
101+ hours	7 (2.0%)	6 (1.9%)	1 (3.2%)
Missing	82 (23.1%)	76 (23.5%)	6 (19.4%)
Educators			
Fewer than 20 hours	29 (8.2%)	27 (8.3%)	2 (6.5%)
21 to 40 hours	77 (21.7%)	72 (22.2%)	5 (16.1%)
41 to 60 hours	69 (19.4%)	67 (20.7%)	2 (6.5%)
61 to 80 hours	61 (17.2%)	57 (17.6%)	4 (12.9%)
81 to 100 hours	41 (11.5%)	37 (11.4%)	4 (12.9%)
101+ hours	63 (17.7%)	52 (16.0%)	11 (35.5%)
Missing	15 (4.2%)	12 (3.7%)	3 (9.7%)

Most of the educators reported that their Future City program had the support of a mentor this year (58%) or at least for part of the year (14%). This is consistent with the 2012 findings.

**Table 16:
Mentor Support**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 324	N = 31
Yes	209 (60.2%)	205 (57.7%)	189 (58.3%)	16 (51.6%)
No	73 (21.0%)	79 (22.3%)	72 (22.2%)	7 (22.6%)
For part of year	50 (14.4%)	49 (13.8%)	46 (14.2%)	3 (9.7%)
Missing	0 (0.0%)	22 (6.2%)	17 (5.2%)	5 (16.1%)

Mentors

Mentors' professional background characteristics are summarized in the table below. Most mentors reported that they were professional engineers (83%). The most common types of engineers were civil (24%), electrical (14%), and mechanical (14%). This finding is consistent with the 2012 findings.

Mentors reported that they belonged to a wide variety of national engineering associations. The two associations represented most frequently were the ASCE (18%) and the IEEE (12%).

**Table 17:
Mentors' Professional Backgrounds**

	2014 Total	Regional Competitions	National Competition
	N = 90	N = 68	N = 22
Profession			
Engineer	75 (83.3%)	57 (83.8%)	18 (81.8%)
Architect	2 (2.2%)	2 (2.9%)	0 (0.0%)
Project manager	2 (2.2%)	1 (1.5%)	1 (4.5%)
Technician	2 (2.2%)	2 (2.9%)	0 (0.0%)
City planner	1 (1.1%)	1 (1.5%)	0 (0.0%)
Other ⁵	8 (8.9%)	5 (7.4%)	3 (13.6%)
Types of Engineers			
Civil	22 (24.4%)	16 (23.5%)	6 (27.3%)
Electrical	13 (14.4%)	11 (16.2%)	2 (9.1%)
Mechanical	13 (14.4%)	10 (14.7%)	3 (13.6%)
Computer	7 (7.8%)	6 (8.8%)	1 (4.5%)
Environmental	6 (6.7%)	5 (7.4%)	1 (4.5%)
Industrial	6 (6.7%)	4 (5.9%)	2 (9.1%)
Chemical	3 (3.3%)	2 (2.9%)	1 (4.5%)
Aerospace	2 (2.2%)	1 (1.5%)	1 (4.5%)
Ceramics & Materials	1 (1.1%)	1 (1.5%)	0 (0.0%)
Missing or N/A	17 (18.9%)	12 (17.6%)	5 (22.7%)
Memberships in National Engineering Associations			
ASCE	16 (17.8%)	10 (14.7%)	6 (27.3%)
IEEE	11 (12.2%)	7 (10.3%)	4 (18.2%)
IEEEUSA	5 (5.6%)	3 (4.4%)	2 (9.1%)
SWE	5 (5.6%)	4 (5.9%)	1 (4.5%)
ASHRAE	4 (4.4%)	3 (4.4%)	1 (4.5%)

⁵ Includes a technical support employee, two landscape architects, one military engineer, one computer programmer, one math teacher, one environmental scientist, one student in chemical engineering, and one retired manager.

	2014 Total	Regional Competitions	National Competition
	N = 90	N = 68	N = 22
IIE	4 (4.4%)	3 (4.4%)	1 (4.5%)
NCESS	3 (3.3%)	1 (1.5%)	2 (9.1%)
SME	3 (3.3%)	3 (4.4%)	0 (0.0%)
ACEC	2 (2.2%)	1 (1.5%)	1 (4.5%)
AICHE	2 (2.2%)	2 (2.9%)	0 (0.0%)
ASME	1 (1.1%)	0 (0.0%)	1 (4.5%)
NSPE	1 (1.1%)	0 (0.0%)	1 (4.5%)
SHPE	1 (1.1%)	1 (1.5%)	0 (0.0%)

Note: Totals may add up to more than 100% as mentors could choose more than one option. Questions were open-ended in 2012 versus multiple-choice in 2014, so direct comparisons may not be possible.

The average number of years that the mentors reported having worked with children as mentors or volunteers, including Future City, was 6.01 years (standard deviation = 5.846), with a range of 1 to 20 years. Mentors reported volunteering as a Future City mentor for an average of 2.94 years (standard deviation = 3.30), with a range from 1 to 16 years. These findings are similar to the 2012 findings, when mentors reported having 6.28 years of volunteer experience and 2.56 years of experience specific to Future City.

Mentors whose teams only went to the Regional competitions were more than twice as likely as mentors whose teams went to the National competition to be first-year mentors (35% versus 14%), but this difference was not statistically significant (likely due to the small sample sizes).

Nearly one-third of the mentors reported that they had previously served as Future City judges (31%). This is higher than the proportion reported in 2012 (23%). Mentors whose teams went to the National competition were statistically more likely than mentors whose teams went to the Regional competitions only to have previously volunteered as organizing committee members (18% versus 3%).⁶

⁶ Chi-square (df = 1) = 6.205, p = .030.

**Table 18:
Mentors' Years of Experience**

	2014 Total	Regional Competitions	National Competition
	N = 90	N = 68	N = 22
Working with Children as a Mentor or Volunteer			
1 – This is first year	27 (30.0%)	24 (35.3%)	3 (13.6%)
2	7 (7.8%)	6 (8.8%)	1 (4.5%)
3	7 (7.8%)	6 (8.8%)	1 (4.5%)
4	9 (10.0%)	6 (8.8%)	3 (13.6%)
5	3 (3.3%)	1 (1.5%)	2 (9.1%)
6	1 (1.1%)	1 (1.5%)	0 (0.0%)
7	6 (6.7%)	4 (5.9%)	2 (9.1%)
8	5 (5.6%)	2 (2.9%)	3 (13.6%)
9	3 (3.3%)	1 (1.5%)	2 (9.1%)
10	5 (5.6%)	2 (2.9%)	3 (13.6%)
11 or more	14 (15.6%)	14 (15.6%)	0 (0.0%)
Missing	3 (3.3%)	1 (1.5%)	2 (9.1%)
Volunteering as a Future City Mentor			
1 – This is first year	40 (44.4%)	35 (51.5%)	5 (22.7%)
2	16 (17.8%)	11 (16.2%)	5 (22.7%)
3	11 (12.2%)	7 (10.3%)	4 (18.2%)
4	3 (3.3%)	2 (2.9%)	1 (4.5%)
5 or more	14 (15.6%)	10 (14.7%)	4 (18.2%)
Missing	6 (6.7%)	3 (4.4%)	3 (13.6%)
Besides Mentor, Role(s) Played in Future City			
Judge	28 (31.1%)	20 (29.4%)	8 (36.4%)
Organizing committee	6 (6.7%)	2 (2.9%)	4 (18.2%)*
Competition volunteer	4 (4.4%)	3 (4.4%)	1 (4.5%)
Other	5 (5.6%)	4 (5.9%)	1 (4.5%)

* Statistically significant at the $p < .05$ level.

Note: Questions were open-ended in 2012 versus multiple-choice in 2014, so direct comparisons may not be possible.

Mentors reported having many different motivations for volunteering to be a Future City mentor. The most popular reasons were that they enjoyed working with students (61%), that they enjoyed the experience and found it to be rewarding (58%), and that they wanted to encourage student interest in STEM (59%). These were also popular motivations in 2012.

**Table 19:
Mentors' Motivation for Volunteering**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 250	N = 90	N = 68	N = 22
Enjoy working with students	34 (13.7%)	66 (61.1%)	42 (61.8%)	13 (59.1%)
Enjoy the experience, it's rewarding	31 (12.4%)	52 (57.8%)	39 (57.4%)	13 (59.1%)
Encourage student interest in STEM	57 (22.9%)	53 (58.9%)	41 (60.3%)	12 (54.5%)
Asked by a teacher, colleague, or friend	36 (14.5%)	45 (50.0%)	37 (54.4%)	8 (36.4%)
Desire to volunteer/mentor	34 (13.7%)	44 (48.9%)	35 (51.5%)	9 (40.9%)
Interest in Future City	25 (10.0%)	43 (47.8%)	32 (47.1%)	11 (50.0%)
My own relative (child, nephew/niece) is a participant	32 (12.9%)	22 (24.4%)	17 (25.0%)	5 (22.7%)

Note: Questions were open-ended in 2012 versus multiple-choice in 2014, so direct comparisons may not be possible.

Most mentors reported working upwards of 60 hours total on Future City (74%) during the year. Mentors whose teams went to the National competition were more than four times as likely as mentors whose teams did not to report working more than 81 hours over the course of the year (32% versus 7%).⁷

**Table 20:
Number of Hours Dedicated to Future City**

	2014 Total	Regional Competitions	National Competition
	N = 90	N = 68	N = 22
Fewer than 20 hours	21 (23.3%)	18 (26.5%)	3 (13.6%)
21 to 40 hours	25 (27.8%)	20 (29.4%)	5 (22.7%)
41 to 60 hours	21 (23.3%)	17 (25.0%)	4 (18.2%)
61 to 80 hours	7 (7.8%)	6 (8.8%)	1 (4.5%)
81 to 100 hours	6 (6.7%)	3 (4.4%)	3 (13.6%)
101+ hours	6 (6.7%)	2 (2.9%)	4 (18.2%)
Missing	4 (4.4%)	2 (2.9%)	2 (9.1%)

⁷ Chi-square (df = 6) = 11.491, p = .074.

Findings

Students

Students' favorite aspects of Future City included the presentation, researching and designing the essay, and model building.

Overall, most students reported that they enjoyed all the aspects of their Future City experience. As summarized in the table below, most students reported that they enjoyed:

- Delivering the presentation (93%)
- Researching the essay (85%)
- Preparing the presentation (83%)
- Designing the essay solution (79%)
- Building the model (75%)

In 2012, two of the most popular activities were also building the model and delivering the presentation. But, in 2012, most students also gave high marks to working with a team and designing the city in SIM City.

Students in the Regional sample were more likely than the students in the National sample to report that they enjoyed designing the city in SIM City (68% versus 52%). This difference was statistically significant.⁸

Students in the National sample were statistically more likely than students in the Regional sample to report that they enjoyed working with a team (70% versus 65%).⁹

**Table 21:
Proportion of Students that Reported Enjoyment of Future City Activities¹⁰**

	2012 Total	2014 Total	2014 Regional Competitions	2014 National Competition
Delivering the presentation	1269 out of 1749 (72.6%)	501 out of 537 (93.3%)	443 out of 475 (93.3%)	58 out of 62 (93.5%)
Researching the essay	See note	451 out of 530 (85.1%)	397 out of 465 (85.4%)	54 out of 65 (83.1%)
Preparing the presentation	1260 out of 1903 (66.2%)	449 out of 542 (82.8%)	394 out of 479 (82.3%)	55 out of 63 (87.3%)

⁸ Chi-square (df = 6) = 12.226, p = .057.

⁹ Chi-square (df = 6) = 23.955, p = .001.

¹⁰ For all student data reported the margin of error is +/- 4 points, assuming a total of 40,000 students participating in Future City in 2013-14.

	2012 Total	2014 Total	2014 Regional Competitions	2014 National Competition
Designing the essay solution	See note	409 out of 518 (79.0%)	362 out of 453 (79.9%)	47 out of 65 (72.3%)
Building the model	1908 out of 2063 (92.5%)	338 out of 452 (74.8%)	309 out of 404 (76.5%)	29 out of 48 (60.4%)
Writing the research essay	See note	329 out of 448 (73.4%)	295 out of 402 (73.4%)	34 out of 46 (73.9%)
Writing the city narrative	Not collected	321 out of 482 (66.6%)	283 out of 424 (66.7%)	38 out of 58 (65.5%)
Working in a team	1796 out of 2110 (85.1%)	317 out of 483 (65.6%)	277 out of 426 (65.0%)	40 out of 57 (70.2%)*
Designing the city in SIM City	1303 out of 1798 (72.5%)	293 out of 443 (66.1%)	265 out of 389 (68.1%)**	28 out of 54 (51.9%)
Managing a project	Not collected	249 out of 454 (54.5%)	218 out of 402 (54.2%)	31 out of 52 (59.6%)
Using technology to complete the project	Not collected	253 out of 487 (52.0%)	225 out of 427 (53.7%)	28 out of 60 (46.7%)

* Statistically significant at the $p < .10$ level.

** Statistically significant at the $p < .05$ level.

Note: In 2012, we asked students to indicate the degree to which they enjoyed “the essay” and 822 out of 1799 (45.7%) of students reported that they enjoyed it. In 2014, we separated out the various components involved in producing the essay.

Future City helped students gain 21st century skills.

We asked students to report what new skills or ideas they learned as a result of participating in Future City. As summarized in the table below, most students reported that they gained 21st century skills including:

- Learned how to plan a project (91%),
- Learned how to execute a project (89%),
- Learned how cities work (88%),
- Improved my problem-solving skills (83%),
- Improved my ability to work with a team (82%),
- Learned how to use engineering to solve real world problems (81%),
- Learned about the engineering design process (81%),
- Felt comfortable working in a self-directed manner (78%), and
- Learned how to apply math and science to real world problems (75%).

Students in the National sample were statistically more likely than students in the Regional sample to report that Future City helped them improve their problem-solving skills (86% versus 82%) and research skills (74% versus 71%).¹¹

**Table 22:
Proportion of Students that Reported Learning or Gaining New Skills from Future City**

<i>Future City helped me...</i>	2014 Total	Regional Competitions	National Competition
...learn how to plan a project.	494 out of 545 (90.6%)	435 out of 481 (90.4%)	59 out of 64 (92.2%)
...learn how to execute a project.	478 out of 539 (88.7%)	420 out of 476 (88.2%)	58 out of 63 (92.1%)
...learn how cities work.	475 out of 543 (87.5%)	418 out of 479 (87.3%)	57 out of 64 (89.1%)
...improve my ability to work with a team.	441 out of 535 (82.4%)	390 out of 474 (82.3%)	51 out of 61 (83.6%)
...improve my problem-solving skills.	434 out of 524 (82.8%)	383 out of 465 (82.4%)	51 out of 59 (86.4%)*
...learn how to use engineering to solve real world problems.	435 out of 535 (81.3%)	384 out of 472 (81.4%)	51 out of 63 (81.0%)
...learn about the engineering design process.	439 out of 543 (80.8%)	386 out of 479 (80.6%)	53 out of 64 (82.8%)
...feel comfortable working in a self-directed manner.	422 out of 543 (77.7%)	371 out of 479 (77.5%)	51 out of 64 (79.7%)
...learn how to apply math and science to real-world problems.	401 out of 538 (74.5%)	358 out of 475 (75.4%)	43 out of 63 (68.3%)
...improve my time management skills.	390 out of 529 (73.7%)	346 out of 469 (73.8%)	44 out of 64 (68.8%)
...improve my public speaking skills.	382 out of 531 (71.9%)	338 out of 470 (71.9%)	44 out of 61 (72.1%)
...improve my research skills.	378 out of 531 (71.2%)	333 out of 470 (70.9%)	45 out of 61 (73.8%)*
...learn to be a better citizen.	329 out of 536 (61.4%)	293 out of 474 (61.8%)	36 out of 62 (58.1%)
...improve my writing skills.	302 out of 537 (56.2%)	264 out of 474 (55.7%)	38 out of 63 (60.3%)

* Statistically significant at the $p < .05$ level.

Note: This was asked as an open-ended question last year, so a direct comparison of proportions from 2012 and 2014 is not possible.

¹¹ Research skills chi-square (df = 5) = 14.297, $p = .014$; Problem solving chi-square (df = 5) = 14.097, $p = .015$.

Future City helped students learn the value of teamwork, gain an appreciation for STEM, and gave them an outlet for their creativity.

In the table below, we summarize students' self-reports of the positive impacts they received from Future City. Highly consistent with the 2012 findings, most students reported that Future City:

- Helped me to appreciate all the engineering that goes into a city (88%),
- Taught me that I can work in a team to create something with little direction from a teacher (86%),
- Helped me to see the value in working with a team to solve problems (84%),
- Helped me see that math and science are important to my future (84%), and
- Gave me an outlet for my creativity and imagination (79%).

**Table 23:
Proportion of Students that Reported Positive Impacts from Future City**

<i>Future City...</i>	2012 Total	2014 Total	Regional Competitions	National Competition
...has helped me to appreciate all the engineering that goes into a city.	1894 out of 2107 (89.9%)	454 out of 518 (87.6%)	401 out of 457 (87.7%)	53 out of 61 (86.9%)
...taught me that I can work in a team to create something with little direction from a teacher.	1791 out of 2118 (84.6%)	445 out of 517 (86.1%)	395 out of 455 (86.8%)	50 out of 62 (80.1%)
...has helped me to see the value in working with a team to solve problems.	1820 out of 2116 (86.0%)	434 out of 518 (83.8%)	380 out of 456 (83.3%)	54 out of 62 (87.1%)
...has helped me see that math and science are important to my future.	1770 out of 2107 (84.0%)	434 out of 520 (83.5%)	385 out of 458 (84.1%)	49 out of 62 (79.0%)
...has given me an outlet for my creativity and imagination.	1804 out of 2107 (85.6%)	408 out of 519 (78.6%)	363 out of 457 (79.4%)	45 out of 62 (72.3%)
...has boosted my confidence in myself.	1445 out of 2112 (68.9%)	345 out of 514 (67.1%)	308 out of 453 (68.0%)	37 out of 61 (60.7%)
...has given me a place where I fit in.	1242 out of 2105 (59.0%)	340 out of 520 (65.4%)	300 out of 458 (65.5%)	40 out of 62 (64.5%)
...has made me think that I could be an engineer someday.	1259 out of 2111 (59.6%)	336 out of 517 (65.0%)	297 out of 456 (65.1%)	39 out of 61 (63.9%)
...has helped me learn the value of ethics.	1436 out of 2074 (69.2%)	332 out of 512 (64.8%)	293 out of 452 (64.8%)	39 out of 60 (65.0%)
...has made me more aware of civics issues like politics and taxes.	1366 out of 2104 (64.9%)	326 out of 517 (63.1%)	294 out of 455 (64.6%)	32 out of 62 (51.6%)

<i>Future City...</i>	2012 Total	2014 Total	Regional Competitions	National Competition
...has made me interested in doing other engineering clubs or activities.	1279 out of 2104 (60.8%)	318 out of 520 (61.2%)	278 out of 458 (60.7%)	40 out of 62 (64.5%)
...has given me a chance to use my creative writing skills.	1337 out of 2108 (63.4%)	317 out of 519 (61.1%)	279 out of 457 (61.1%)	38 out of 62 (61.3%)
...has helped me in my other classes.	904 out of 2069 (43.7%)	248 out of 512 (48.4%)	219 out of 452 (48.5%)	29 out of 60 (48.3%)

Most students found Future City to be challenging and rewarding and most would like to repeat the experience.

We asked students to report whether Future City was challenging and/or rewarding. Most students (78%) reported that Future City was both challenging and rewarding. The findings are summarized in the table below.

**Table 24:
Proportion of Students that Reported Future City was Challenging and/or Rewarding**

	Total	Regional Competitions	National Competition
	N = 509	N = 450	N = 60
Future City was challenging AND rewarding.	397 (78.0%)	351 (78.0%)	46 (76.7%)
Future City was challenging, but NOT rewarding.	90 (17.7%)	80 (17.8%)	10 (16.7%)
Future City was NOT challenging, but it was rewarding.	12 (2.4%)	10 (2.2%)	3 (5.0%)
Future City was NOT challenging, nor was it rewarding.	10 (2.0%)	9 (2.0%)	1 (1.7%)

Note: We did not ask this question the same way in 2012, so a direct comparison between the two years is not possible.

More than two-thirds of students (69%) reported that they would be interested in participating in Future City again in the future. This is a slightly higher proportion than the proportion of students who were interested in repeating the experience in 2012 (66%).

Future City mentors provided guidance to students, helped them understand what engineers do, and helped students to see themselves as engineers someday.

We asked students whether their team had an engineering mentor this year. The majority of the students (76%) reported that they did have a mentor.

As summarized in the table below, nearly three-quarters of all students reported that their mentors were important in guiding the students on their projects (73%, which is lower than the 79% who reported this in 2012). National participants were more likely than Regional participants to report having guidance from their mentors (81% versus 72%), but this difference was not statistically significant.

Nearly three-quarters of the students reported that their mentors explained what they did in their jobs (71%, which is lower than the 81% who reported this in 2012).

About half of all students (53%) reported that their mentors helped them see themselves as engineers someday. This was consistent with the findings from 2012. We observed that National participants were more likely than Regional participants to report that their mentors helped them see themselves as engineers someday (67% versus 57%), however, this difference was not statistically significant.

**Table 25:
Proportion of Students that Reported that the Mentor was Helpful**

<i>"My Future City mentor (the engineer)..."</i>	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 1779	N = 387	N = 345	N = 42
...was important in guiding us on the project."	1441 (79.3%)	283 (73.1%)	249 (72.2%)	34 (81.0%)
...explained what s/he does in his job."	1448 (81.4%)	275 (71.1%)	246 (71.3%)	29 (69.0%)
...helped me to see myself as an engineer someday."	943 (53.0%)	223 (57.6%)	195 (56.5%)	28 (66.7%)

Future City projects were primarily student-driven.

We asked students to report how design decisions were made in their teams. The majority (75%) reported that the students themselves were mainly responsible for design decisions (a significant increase from 2012). Another 23%

reported that the responsibility for design decisions was shared between students and their educators and/or mentors (reflecting a decrease from 2012).

National participants were more likely than Regional participants to report that design decisions were primarily the responsibility of the students (79% versus 74%), while Regional participants were more likely than National participants to report that they shared the responsibility for design decisions with the adults working with the teams (24% versus 18%), but these differences were not statistically significant.

**Table 26:
Proportion of Students that Reported How Design Decisions were Made**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 2215	N = 511	N = 450	N = 61
The kids in my group mostly made the design decisions.	1369 (61.8%)	381 (74.6%)	333 (74.0%)	48 (78.7%)
The kids and adults shared the responsibility equally for the design decisions.	628 (28.4%)	117 (22.9%)	106 (23.6%)	11 (18.0%)
The adults (teacher and/or mentor) mostly made the design decisions.	83 (3.7%)	13 (2.5%)	11 (2.4%)	2 (3.3%)

Parents

Parents confirmed that Future City helped their children learn about project management and other important 21st century skills.

Most parents reported that Future City had positive impacts on their children across a number of different areas (see table below). The most common impacts were:

- Their children learned how to execute a project (97%),
- Their children learned about how cities work (95%),
- Their children learned how to plan a project (95%),
- Their children improved their ability to work with a team (95%), and
- Their children learned how to use engineering to solve real world problems (93%).

**Table 27:
Parent Perceptions of Impact on their Children¹²**

<i>Future City helped my child(ren)...</i>	Total	Regional Competitions	National Competition
...learn how to execute a project.	306 out of 317 (96.5%)	275 out of 285 (96.5%)	31 out of 33 (93.9%)
...learn about how cities work.	304 out of 319 (95.3%)	273 out of 286 (95.5%)	31 out of 33 (93.9%)
...learn how to plan a project.	301 out of 317 (95.0%)	272 out of 286 (95.1%)	29 out of 31 (93.5%)
...improve their ability to work with a team.	299 out of 316 (94.6%)	268 out of 283 (94.7%)	21 out of 32 (65.6%)
...learn how to use engineering to solve real world problems.	291 out of 313 (93.0%)	260 out of 280 (93.9%)	31 out of 33 (93.9%)
...learn about the engineering design process.	293 out of 319 (91.8%)	261 out of 286 (91.3%)	32 out of 22 (97.0%)
...improve their problem-solving skills.	286 out of 317 (90.2%)	258 out of 285 (90.5%)	28 out of 32 (87.5%)
...feel comfortable working in a self-directed manner.	281 out of 317 (88.6%)	251 out of 284 (88.4%)	30 out of 33 (90.9%)
...learn how to apply math and science to real world problems.	278 out of 315 (88.3%)	247 out of 282 (87.6%)	31 out of 33 (93.9%)
...improve their research skills.	268 out of 308 (87.0%)	239 out of 278 (86.0%)	29 out of 32 (90.6%)
...improve their public speaking skills.	265 out of 312 (84.9%)	241 out of 278 (86.7%)	24 out of 32 (75.0%)
...improve their time management skills.	250 out of 312 (80.1%)	225 out of 280 (80.4%)	25 out of 32 (78.1%)
...learn to be a better citizen.	228 out of 313	208 out of 280	20 out of 33

¹² For all parent data reported the margin of error is +/- 5 points, based on a total of 35,000 parents of students participating in Future City in 2013-14.

<i>Future City helped my child(ren)...</i>	Total	Regional Competitions	National Competition
	(72.8%)	(74.3%)	(60.6%)
...improve their writing skills.	216 out of 306 (70.6%)	195 out of 273 (71.4%)	21 out of 32 (65.6%)

Note: These questions were asked differently, and with a different scale, in 2012.

Future City fully met or exceeded parents' expectations.

We asked parents to report on the extent to which Future City met their expectations (regardless of what their expectations were). The 2014 findings mirror very closely the 2012 findings. Most parents reported that Future City fully met or exceeded their expectations (85%).

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

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 593	N = 330	N = 295	N = 35
Exceeded expectations	245 (41.3%)	136 (41.2%)	117 (39.7%)	19 (54.3%)
Fully met expectations	245 (41.3%)	144 (43.6%)	134 (45.4%)	10 (28.6%)
Partially met expectations	40 (6.7%)	35 (10.6%)	32 (10.8%)	3 (8.6%)
Did not meet expectations	9 (1.5%)	3 (0.9%)	2 (0.7%)	1 (2.9%)
Missing	54 (9.1%)	12 (3.6%)	10 (3.4%)	2 (5.7%)

Parents would recommend Future City to other families.

We asked parents whether they would recommend Future City to other families. As summarized in the table below, the majority of parents (88%) reported that they would recommend it to other families. This finding is highly consistent with the 2012 finding that 87% would recommend it.

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

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 593	N = 330	N = 295	N = 35
Yes	516 (87.0%)	290 (87.9%)	260 (88.1%)	30 (85.7%)
Maybe	27 (4.6%)	24 (7.3%)	22 (7.5%)	2 (5.7%)
No	1 (0.2%)	5 (1.5%)	4 (1.4%)	1 (2.9%)
Missing	49 (8.3%)	11 (3.3%)	9 (3.1%)	2 (5.7%)

Educators

Educators confirmed that Future City helped their students learn valuable 21st century skills.

Most educators reported that Future City had positive impacts on their students across a number of different areas (see table below). The most common impacts were:

- Their students learned about how cities work (97%),
- Their students learned how to plan a project (96%),
- Their students learned how to execute a project (96%),
- Their students improved their ability to work with a team (95%), and
- Their students improved their public speaking skills (95%).

All (100%) educators whose teams went to the National competition reported that their students learned how to use engineering to solve real world problems and learned about the engineering design process.

**Table 30:
Educator Perceptions of Impact on their Students¹³**

<i>Future City helped my students...</i>	Total	Regional Competitions	National Competition
...learn how to plan a project.	330 out of 341 (96.8%)	302 out of 312 (96.8%)	28 out of 29 (96.6%)
...learn about how cities work.	326 out of 339 (96.2%)	298 out of 310 (96.1%)	28 out of 29 (96.6%)
...learn how to execute a project.	326 out of 341 (95.6%)	299 out of 312 (95.8%)	27 out of 29 (93.1%)
...improve their ability to work with a team.	323 out of 339 (95.3%)	295 out of 310 (95.2%)	28 out of 29 (96.6%)
...improve their public speaking skills.	322 out of 339 (95.0%)	295 out of 311 (94.9%)	27 out of 29 (93.1%)
...learn how to use engineering to solve real world problems.	310 out of 342 (90.6%)	281 out of 313 (89.8%)	29 out of 29 (100.0%)
...learn how to apply math and science to real world problems.	311 out of 340 (91.5%)	283 out of 311 (91.0%)	28 out of 29 (96.6%)
...feel comfortable working in a self-directed manner.	296 out of 334 (88.6%)	268 out of 305 (87.9%)	28 out of 29 (96.6%)
...improve their research skills.	299 out of 338 (88.5%)	272 out of 310 (87.7%)	27 out of 29 (93.1%)
...learn about the engineering design process.	300 out of 342 (87.7%)	271 out of 313 (86.6%)	29 out of 29 (100.0%)
...improve their time management skills.	281 out of 334 (84.1%)	257 out of 307 (83.7%)	24 out of 27 (88.9%)

¹³ For all educator data reported the margin of error is +/- 5 points, based on a total of 1,350 educators participating in Future City in 2013-14.

<i>Future City helped my students...</i>	Total	Regional Competitions	National Competition
...improve their writing skills.	275 out of 341 (80.6%)	249 out of 312 (79.8%)	26 out of 29 (89.7%)
...improve their problem-solving skills.	270 out of 336 (80.4%)	297 out of 313 (94.9%)	27 out of 28 (96.4%)
...learn to be a better citizen.	244 out of 342 (71.3%)	221 out of 306 (72.2%)	23 out of 29 (79.3%)

Future City fully met or exceeded educators' expectations.

We asked educators to report on the extent to which Future City met their expectations. As observed in 2012, most educators reported that Future City fully met or exceeded their expectations (81%).

**Table 31:
Degree to Which Educator Expectations were Met**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 347	N = 355	N = 295	N = 35
Exceeded expectations	82 (23.6%)	106 (29.9%)	95 (29.3%)	11 (35.5%)
Fully met expectations	182 (52.4%)	182 (51.3%)	169 (52.2%)	13 (41.9%)
Partially met expectations	43 (12.4%)	41 (11.5%)	38 (11.7%)	3 (9.7%)
Did not meet expectations	15 (4.3%)	9 (2.5%)	7 (2.2%)	2 (6.5%)
Missing	25 (7.2%)	17 (4.8%)	15 (4.6%)	2 (6.5%)

Educators would recommend Future City to their colleagues.

We asked educators whether they would recommend Future City to other educators. As summarized in the table below, the majority of educators (93%) reported that they would, or probably would, recommend it to their colleagues. This finding is highly consistent with the 2012 finding that 91% would recommend it.

**Table 32:
Proportion of Educators Who Would Recommend Future City**

	2014 Total	Regional Competitions	National Competition
	N = 335	N = 324	N = 31
Yes	294 (82.8%)	270 (83.3%)	24 (77.4%)
Maybe	35 (9.9%)	34 (10.5%)	1 (3.2%)
No	6 (1.7%)	4 (1.2%)	2 (6.5%)
Missing	20 (5.6%)	16 (4.9%)	4 (12.9%)

Educators reported that Future City was challenging and rewarding for them and their students.

Nearly all educators reported that Future City was challenging and rewarding for their students (94%) and for them (89%).

**Table 33:
Proportion of Educators that Reported Future City was Challenging and/or Rewarding for Them and Their Students**

	Total	Regional Competitions	National Competition
	N = 338	N = 309	N = 29
Impact on Students			
Future City was challenging AND rewarding for my students.	317 (93.8%)	290 (93.9%)	27 (93.1%)
Future City was challenging, but NOT rewarding for my students.	19 (5.6%)	17 (5.5%)	2 (6.9%)
Future City was NOT challenging, but it was rewarding for my students.	1 (0.3%)	1 (0.3%)	0 (0.0%)
Future City was NOT challenging, nor was it rewarding for my students.	1 (0.3%)	1 (0.3%)	0 (0.0%)
Impact on Educators			
Future City was challenging AND rewarding for me.	301 (89.1%)	275 (89.0%)	26 (89.7%)

	Total	Regional Competitions	National Competition
	N = 338	N = 309	N = 29
Future City was challenging, but NOT rewarding for me.	24 (7.1%)	21 (6.8%)	3 (10.3%)
Future City was NOT challenging, but it was rewarding for me.	11 (3.3%)	11 (3.6%)	0 (0.0%)
Future City was NOT challenging, nor was it rewarding for me.	2 (0.6%)	2 (0.6%)	0 (0.0%)

Note: We did not ask this question the same way in 2012, so a direct comparison between the two years is not possible.

Most educators reported that the Future City workload was appropriate for them (80%) and their students (86%). This was true of educators whose teams went to Regional competitions as well as those whose teams went to the National competition.

**Table 34:
Educator Perceptions of Appropriateness of Workload**

	2014 Total	Regional Competitions	National Competition
The amount of work Future City required was appropriate for my students.	289 out of 336 (86.0%)	265 out of 309 (85.8%)	24 out of 29 (82.8%)
The amount of work Future City required was appropriate for me.	270 out of 336 (80.4%)	247 out of 308 (80.2%)	23 out of 28 (82.1%)

We asked educators how easy or challenging it was for them to make connections between the simulation (SimCity), the essay, and the model. Forty-three percent of educators reported that it was challenging while 21% reported it was easy, and 30% were neutral on the matter.

The Learning Blocks were helpful to educators, but about half of educators were unaware of them.

We asked educators whether they used the Learning Blocks this year and, if so, whether the activities from the learning blocks helped their students with the Future City components. Most educators who knew about them (89%) reported that the Learning Blocks were helpful – 100% of the educators whose teams went to the National competition reported that the Learning Blocks were helpful. It's important to note that half of all educators (49%) reported that they were not

even aware of the Learning Blocks. This is the same proportion as in 2012, so more work remains to be done to increase awareness.

**Table 35:
Educator Perceptions of the Learning Blocks**

	Total	Regional Competitions	National Competition
	N = 355	N = 324	N = 31
Used Learning Blocks	74 (20.8%)	67 (20.7%)	7 (22.6%)
Learning Blocks were helpful	66 (89.2%)	59 (88.0%)	7 (100.0%)
Learning Blocks were not helpful	8 (10.8%)	8 (2.5%)	0 (0.0%)
Did not use Learning Blocks	260 (73.2%)	239 (73.8%)	21 (67.7%)
Did not know about Learning Blocks	126 (48.5%)	117 (49.0%)	9 (42.9%)
Missing	21 (5.9%)	18 (5.6%)	3 (9.7%)

Note: We did not ask this question the same way in 2012, so a direct comparison between the two years is not possible.

Mentors

Mentors confirmed the positive impact of Future City on students' 21st century skills.

Most mentors reported that Future City had positive impacts on their students across a number of different areas (see table below). The most commonly reported impacts were that students:

- Learned about how cities work (99%),
- Improved their ability to work with a team (99%),
- Improved their public speaking skills (99%),
- Learned about the engineering design process (96%), and
- Improved their problem-solving skills (94%).

Table 36:
Mentor Perceptions of Impact on their Students¹⁴

<i>Future City helped my students...</i>	Total	Regional Competitions	National Competition
...learn about how cities work.	81 out of 82 (98.8%)	64 out of 65 (98.5%)	17 out of 17 (100.0%)
...improve their ability to work with a team.	80 out of 81 (98.8%)	63 out of 64 (98.4%)	17 out of 17 (100.0%)
...improve their public speaking skills.	80 out of 81 (98.8%)	63 out of 64 (98.4%)	17 out of 17 (100.0%)
...learn about the engineering design process.	79 out of 82 (96.3%)	62 out of 65 (95.4%)	17 out of 17 (100.0%)
...improve their problem-solving skills.	76 out of 81 (93.8%)	59 out of 64 (92.2%)	17 out of 17 (100.0%)
...learn how to execute a project.	75 out of 81 (92.6%)	59 out of 64 (92.2%)	16 out of 17 (94.1%)
...learn how to plan a project.	74 out of 80 (92.5%)	58 out of 63 (92.1%)	16 out of 17 (94.1%)
...learn how to use engineering to solve real world problems.	75 out of 82 (91.5%)	59 out of 65 (90.8%)	16 out of 17 (94.1%)
...learn how to apply math and science to real world problems.	72 out of 82 (87.8%)	55 out of 65 (84.6%)	17 out of 17 (100.0%)
...learn to be a better citizen.	66 out of 80 (82.5%)	46 out of 63 (73.0%)	10 out of 17 (58.8%)
...feel comfortable working in a self-directed manner.	66 out of 81 (81.5%)	56 out of 65 (86.2%)	10 out of 16 (62.5%)
...improve their writing skills.	67 out of 80 (83.8%)	52 out of 63 (82.5%)	15 out of 17 (88.2%)
...improve their research skills.	74 out of 89 (83.1%)	59 out of 62 (95.2%)	15 out of 17 (88.2%)
...improve their time	68 out of 80	51 out of 63	17 out of 17

¹⁴ For all mentor data reported the margin of error is +/- 10 points, based on a total of 800 mentors participating in Future City in 2013-14.

<i>Future City helped my students...</i>	Total	Regional Competitions	National Competition
management skills.	(85.0%)	(81.0%)	(100.0%)

Future City fully met or exceeded mentors' expectations.

We asked mentors to report on the extent to which Future City met their expectations. Most mentors reported that Future City fully met or exceeded their expectations (83%). The 2014 findings are consistent with the 2012 findings, however, more mentors in 2012 reported that their expectations were exceeded than in 2014.

**Table 37:
Degree to Which Mentor Expectations were Met**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 262	N = 90	N = 68	N = 22
Exceeded expectations	94 (35.9%)	23 (25.6%)	16 (23.5%)	7 (31.8%)
Fully met expectations	137 (52.3%)	52 (57.8%)	40 (58.8%)	12 (54.5%)
Partially met expectations	19 (7.3%)	7 (7.8%)	7 (10.3%)	0 (0.0%)
Did not meet expectations	7 (2.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Missing	5 (1.9%)	8 (8.9%)	5 (7.4%)	3 (13.6%)

Mentors would recommend Future City to their colleagues.

We asked mentors whether they would recommend Future City to their colleagues. As summarized in the table below, the majority of mentors (91%) reported that they would, or might, recommend it to their colleagues. This proportion is slightly lower than the 2012 finding that 97% would recommend it.

**Table 38:
Proportion of Mentors Who Would Recommend Future City**

	2012 Total	2014 Total	Regional Competitions	National Competition
	N = 262	N = 90	N = 68	N = 22
Yes	241 (92.0%)	74 (82.2%)	56 (82.4%)	18 (81.8%)
Maybe	13 (5.0%)	8 (8.9%)	7 (10.3%)	1 (4.5%)
No	2 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Missing	6 (2.3%)	8 (8.9%)	5 (7.4%)	3 (13.6%)

Mentors reported that Future City was challenging and rewarding for them and their students.

Most mentors reported that Future City was challenging and rewarding for them (82%) and their students (87%).

**Table 39:
Proportion of Mentors that Reported Future City was Challenging and/or Rewarding for Them and Their Students**

	Total	Regional Competitions	National Competition
	N = 90	N = 68	N = 22
Impact on Students			
Future City was challenging AND rewarding for my students.	78 (86.7%)	61 (89.7%)	17 (77.3%)
Future City was challenging, but NOT rewarding for my students.	3 (3.3%)	2 (2.9%)	1 (4.5%)
Future City was NOT challenging, but it was rewarding for my students.	0 (0.0%)	0 (0.0%)	0 (0.0%)
Future City was NOT challenging, nor was it rewarding for my students.	0 (0.0%)	0 (0.0%)	0 (0.0%)
Impact on Mentors			
Future City was challenging AND rewarding for me.	74 (82.2%)	57 (83.8%)	17 (77.3%)
Future City was challenging, but NOT rewarding for me.	1 (1.1%)	0 (0.0%)	1 (4.5%)
Future City was NOT challenging, but it was rewarding for me.	8 (8.9%)	7 (10.3%)	1 (4.5%)
Future City was NOT challenging, nor was it rewarding for me.	0 (0.0%)	0 (0.0%)	0 (0.0%)

Note: We did not ask this question the same way in 2012, so a direct comparison between the two years is not possible.

Mentors reported that the amount of work required for Future City was appropriate for them (81%) and for their students (74%). Mentors whose teams went to the National competition were far more likely than mentors whose teams went to the Regional competitions only to report that the workload was appropriate for their students (88% versus 70%), but this difference was not statistically significant.

**Table 40:
Mentor Perceptions of Appropriateness of Workload**

	2014 Total	Regional Competitions	National Competition
The amount of work Future City required was appropriate for my students.	60 out of 81 (74.1%)	45 out of 64 (70.3%)	15 out of 17 (88.2%)
The amount of work Future City required was appropriate for me.	67 out of 83 (80.7%)	52 out of 64 (81.3%)	15 out of 19 (78.9%)

Summary

Future City has continued its legacy of strengthening students' 21st century skills.

Future City is designed to provide an engaging way to build students' 21st century skills. In 2012, we found that Future City was succeeding in achieving these objectives. Data collected in 2014 confirm that Future City has continued its legacy of success. Below is a summary of the main findings.

Future City Helps to Cultivate Teamwork Skills

In 2012, we observed that Future City helped students to develop teamwork skills and to appreciate the value in working with a team. We continued to observe this in 2014:

- 83% of students reported that Future City improved their ability to work with a team.
- 85% reported that they learned how to work with a team to create something with little direction from a teacher.
- 86% reported that Future City helped them to see the value in working with a team to solve problems.

Parents, educators, and mentors confirmed these findings.

Future City Teaches Students to Use the Engineering Design Process to Solve Real-world Challenges

Consistent with the 2012 findings, we found that Future City helped to enhance students' ability to use the engineering design process to solve real-world problems.

- 81% reported that Future City helped them learn about the engineering design process.
- 83% reported that Future City helped improve their problem-solving skills.
- 82% reported that they learned how to use engineering to solve real-world problems.

Parents, educators, and mentors confirmed these findings.

Future City Helps Students Learn the Value of Math and Science

In 2012 and 2014, we found that students reported (and the adults confirmed) that students learned about the importance of math and science through their participation in Future City.

- 75% of students reported that Future City helped them learn how to apply math and science to real-world problems.
- 84% reported that Future City helped them see that math and science are important to their future.

Future City Helps Students Learn How their Communities Work and to Become More Informed Citizens

Another finding that is consistent with 2012 findings is that students learned about (and adults confirmed) how cities work and how to be better citizens by participating in Future City.

- 88% reported that Future City helped them to learn how cities work.
- 90% reported that Future City helped them to appreciate all the engineering that goes into a city.
- 61% reported that they learned how to be a better citizen.
- 65% of students reported that they learned the value of ethics.
- 63% reported that they became more aware of civic issues like politics and taxes.

Future City Helps Students Learn How to Manage their Time and Manage Projects

In 2012 and 2014, we observed that Future City helped students learn valuable project management skills and time management skills.

- 91% of students reported that Future City helped them learn how to plan a project.
- 89% reported that they learned how to execute a project.
- 74% reported that they improved their time management skills.

Parents, educators, and mentors confirmed these findings.

Future City Helps Students Improve their Research and Communication Skills

Consistent with the 2012 findings, we found that students reported improvements in their research skills as well as their written and verbal communication skills as a result of participating in Future City.

- 72% of students reported that Future City improved their public speaking skills.
- 56% reported that Future City improved their writing skills.
- 61% reported that Future City gave them a chance to use their creative writing skills.
- 71% reported an improvement in their research skills.

Parents, educators, and mentors confirmed these findings.

Future City Helps Students Learn How to Work in a Self-Directed Manner

The majority of students (75%) reported that they were mainly responsible for design decisions (a significant increase from 2012), rather than the adults they worked with. Most students (78%) also reported that Future City helped them feel more comfortable working in a self-directed manner.

Future City Mentors Provide Guidance to Students, Help them Understand What Engineers Do, and Help Students to See Themselves as Engineers Someday

- 65% of students reported that Future City made them think they could be an engineer someday.
- 61% of students reported that, as a result of their Future City experience, they were more interested in doing other engineering clubs or activities.

Future City Engages Students

One of Future City's objectives was to *provide an engaging* way for students to build their skills. The data show that students were indeed engaged by Future City. Most Future City participants reported that they enjoyed every aspect of their Future City experience. The most popular aspects of Future City were:

- 93% enjoyed delivering the presentation.
- 85% enjoyed researching the essay.
- 83% enjoyed preparing the presentation.
- 79% enjoyed designing the essay solution.
- 75% enjoyed building the model.

Students reported that Future City provided them with an outlet for their creativity and imagination (79%), boosted their self-confidence (67%), and gave them a place where they “fit in” (65%).

More than two-thirds of students (69%) reported that they would be interested in participating in Future City again in the future. This is a slightly higher proportion than the proportion of students who were interested in repeating the experience in 2012 (66%).

Participants Find Future City to be Challenging and Rewarding

Most students (78%) reported that they found Future City to be both challenging and rewarding. Nearly all educators reported that Future City was challenging and rewarding (89%). Most mentors reported that Future City was challenging and rewarding for them (82%).

Adults Involved in Future City Are Enthusiastic and Dedicated

Parents

- 99% of parents reported that they were involved with Future City in at least one capacity or another:
 - 88% attended the competitions.
 - 81% offered support or encouragement.
 - 62% provided materials or supplies.
- 60% of parents reported donating between 1 and 10 hours to Future City.
- 85% of parents reported that Future City fully met or exceeded their expectations.
- 88% of parents reported that they would recommend Future City to other families.

Educators

- Overall, the average educator reported participating in Future City for 3.77 years (standard deviation = 3.62), with a range of 1 to 17 years.
- More educators are spending time after school to run the Future City programs than in 2012. One-third of programs (33%) offered Future City during school hours, which is a decrease from 2012, when 41% of Future City groups reported meeting during school hours.
- Most educators (37%) worked between 41 and 80 hours on Future City this year.
- 81% of educators reported that Future City fully met or exceeded their expectations.

- 93% of educators reported that they would, or probably would, recommend Future City to their colleagues.

Mentors

- Mentors reported volunteering as a Future City mentor for an average of 2.94 years (standard deviation = 3.30), with a range from 1 to 16 years.
- 74% of mentors (74%) reported dedicating up to 60 hours to Future City.
- 83% of mentors reported that Future City fully met or exceeded their expectations.
- 91% of mentors reported that they would, or might, recommend it to their colleagues.

Future City is Reaching More Underserved Students Today

Since 2012, Future City has reached more non-white, ethnic minority students and children who are *not* related to engineers.

- In 2012, 30% of students were non-White, ethnic minorities. In 2014, this grew to 37%.
- In 2012, 58% of students were not related to an engineer. In 2014, 62% reported they were not related to an engineer.

Notable Differences between National Competitors and Regional Competitors

Because we collected data from separate samples of National and Regional competitors in 2014, we were able to make some observations about differences between the samples. We wondered: is there any difference between students who compete at their Regional competitions only versus students who make it to the National competition? Below are some of the notable differences that are worth continuing to monitor over the coming years, especially with larger samples sizes to confirm these findings. These findings were all statistically significant:

- National competitors tended to be older than Regional competitors.
 - 65% of National competitors were 8th graders (versus 46% of Regional competitors).
 - 14% of Regional competitors were 6th graders (while only 2% of National competitors were 6th graders).
- Programs that sent teams to the National competition were more likely to offer Future City as part of a class, while programs that sent teams only to the Regional competitions were more likely to offer Future City as a club.

- 52% of organizations with teams participating in the National competition offered Future City as a class (versus 36% of those participating in the Regional competitions only).
- 46% of organizations with teams participating in the Regional competitions only offered Future City as a club (versus 29% of those participating in the National competition).
- 18% of mentors whose teams went to the National competition reported that they had previously volunteered as Future City organizing committee members (versus 3% of mentors in Regional competitions).
- 32% of mentors whose teams went to the National competition reported that they worked more than 81 hours on Future City this year (versus 7% of mentors in Regional competitions).
- 68% of students in the Regional sample versus 52% of students in the National sample reported that they enjoyed designing the city in SIM City (68% versus 52%).
- 70% of students in the National sample versus 65% of students in the Regional sample reported that they enjoyed working with a team.
- 86% of students in the National sample versus 82% of students in the Regional sample reported that Future City helped them improve their problem-solving skills.
- 74% of students in the National sample versus 71% of students in the Regional sample reported that Future City helped them improve their research skills.

Area for Improvement

The only area identified as a challenge was awareness of the Learning Blocks. Going forward, Future City will need to continue building awareness of the Learning Blocks.

Appendix A: Student Survey

Please tell us about your experience with Future City. This survey is confidential. Your parents, teachers, and mentors will never know how you answered the questions, so please be honest.

One completed survey will be randomly chosen from your region to receive a \$50 Amazon gift card.

THANK YOU!

In order to be entered in the drawing to win a \$50 Amazon gift card, please provide the following:

1. Your full name: _____
2. Your teacher or afterschool leader's name: _____
(Homeschoolers, please list your parent's name)
3. Name of the organization where you participate in Future City:
4. Future City Region [Drop down list]

Please click on the boxes to tell us what you thought of each part of Future City.

	Loved it	Liked It	In the Middle	Didn't Like it Much	Didn't Like it at All	Didn't Do This
5. Designing the city in SIM City						
6. Researching the essay						
7. Designing the essay solution						
8. Writing the research essay						
9. Writing the city narrative						
10. Building the model						
11. Working in a team						
12. Managing a project						
13. Preparing the presentation						
14. Using technology to complete the project						
15. Delivering the presentation						

What new knowledge did you gain, or what skills did you improve, by participating in Future City?

<i>Future City helped me...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
16. ...learn how to plan a project.					
17. ...learn how to execute a project.					
18. ...feel comfortable working in a self-directed manner..					
19. ...learn about the engineering design process.					
20. ...learn how cities work.					
21. ...learn to be a better citizen.					
22. ...learn how to use engineering to solve real world problems.					
23. ...learn how to apply math and science to real world problems.					
24. ...improve my ability to work with a team.					
25. ...improve my writing skills.					
26. ...improve my research skills.					
27. ...improve my public speaking skills.					
28. ...improve my time management skills.					
29. ...improve my problem-solving skills.					

Please put an X in the boxes to tell us how much you agree with each of the following statements:

<i>Future City...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
30. ...taught me that I can work in a team to create something with little direction from a teacher.					
31. ...has helped me to see the value in working with a team					

<i>Future City...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
to solve problems.					
32. ...has made me think that I could be an engineer someday.					
33. ...has made me interested in doing other engineering clubs or activities.					
34. ...has helped me see that math and science are important to my future.					
35. ...has helped me to appreciate all the engineering that goes into a city.					
36. ...has made me more aware of civics issues like politics and taxes.					
37. ...has given me an outlet for my creativity and imagination.					
38. ...has given me a place where I fit in.					
39. ...has given me a chance to use my creative writing skills.					
40. ...has boosted my confidence in myself.					
41. ...has helped me learn the value of ethics.					
42. ...has helped me in my other classes.					

43. How would you describe your experience with Future City this year?
- It was challenging AND rewarding
 - It was challenging, but NOT rewarding at all
 - It was NOT challenging, but it was rewarding
 - It was NOT challenging, nor was it rewarding

44. Did your group have an engineer mentor?
- Yes
 - No (Skip next question)

(If Yes) Please put an X in the boxes to tell us how much you agree or disagree with each of the following sentences:

<i>"My Future City mentor (the engineer)..."</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
45. ...helped me to see myself as an engineer someday."					
46. ...explained what s/he does in his job."					
47. ...was important in guiding us on the project."					

48. Which of the following is true of your Future City experience?

- a. The kids in my group mostly made the design decisions
- b. The adults (teacher and/or mentor) mostly made the design decisions
- c. The kids and adults shared the responsibility equally for the design decisions

49. Would you participate in Future City again, if you could?

- a. Yes
- b. Maybe
- c. No

50. How many times have you participated in Future City?

- a. This is my 1st time
- b. This is my 2nd time
- c. This is my 3rd time

51. Which of the following engineering programs have you done or would you like to do? **(You may choose more than one answer)**

Programs	I Have Done	I Would Like to Do
Future City only		
FIRST LEGO League		
Project Lead the Way		
Engineering classes		
Technology education classes		
Destination Imagination		

52. Are you related to an engineer?

- a. Yes
- b. No
- c. I don't know

53. Are you a

- a. Girl
- b. Boy

54. How old are you?

- a. Younger than 11
- b. 11
- c. 12
- d. 13
- e. 14
- f. Older than 14

55. What grade are you in?

- a. 6th
- b. 7th
- c. 8th
- d. Other (If they click here, they will get the next question, otherwise, they will skip a question.)

56. What grade are you in? [pull down menu]

57. Which of the following best describes you? **(You may choose more than one answer)**

- a. White or European American
- b. Hispanic, Latino/a or Spanish
- c. Black or African-American
- d. Asian American
- e. Native Hawaiian or Other Pacific Islander
- f. Native American or Alaskan Native
- g. Other: _____

THANK YOU!

Appendix B: Parent Survey

Please take a few moments to tell us about your child's experience with Future City. This information will be used to make the program better, so we appreciate your honesty.

One completed survey will be randomly chosen from your region to receive a \$50 Amazon gift card.

THANK YOU!

In order to be entered in the drawing to win a \$50 Amazon gift card, please provide the following:

1. Your full name: _____
2. Your phone number: _____
3. Your email address: _____
4. Name of the organization where your child participates in Future City:

5. Future City Region [Drop down list]
6. How many of your daughters or sons participated in Future City this year:
 - a. 1
 - b. 2
 - c. 3
 - d. 4 or more children
7. What grades are they in? (Choose all that apply)
 - a. 6th
 - b. 7th
 - c. 8th
 - d. Other (If they click here, they will get the next question, otherwise, they will skip a question.)
8. What grades are your child(ren) in? [pull down menu]
9. In which of the following ways did you contribute to your child(ren)'s team this year? (You may choose more than one answer).
 - a. Provided transportation for team members (not just my child)
 - b. Provided materials or supplies
 - c. Helped the team conduct research

- d. Helped to write essays
- e. Edited or reviewed essays
- f. Served as a mock judge to provide feedback to team
- g. Helped build models
- h. Offered support or encouragement
- i. Provided a space for building, meeting, or storing projects
- j. Supervision over use of power tools
- k. Shared knowledge or mentored
- l. Attended the competition
- m. Chaperoned or supervised team at the competition
- n. I did not contribute to my child's team this year (skip next question)

10. Please estimate the number of hours *you* contributed to Future City this year:

- a. 1-5
- b. 6-10
- c. 11-15
- d. 16-20
- e. 20-30
- f. 31-50
- g. 51-60
- h. 61-80
- i. 81 hours or more

What new knowledge did your child(ren) gain, or what skills did your child(ren) improve, by participating in Future City?

<i>Future City helped my child(ren)...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree	Not Sure
11. ...learn how to plan a project.						
12. ...learn how to execute a project.						
13. ...feel comfortable working in a self-directed manner.						
14. ...learn about the engineering design process.						
15. ...learn about how cities work.						
16. ...learn to be a better citizen.						
17. ...learn how to use engineering to solve real world problems.						
18. ...learn how to apply math and science to real						

<i>Future City helped my child(ren)...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree	Not Sure
world problems.						
19. ...improve their ability to work with a team.						
20. ...improve their writing skills.						
21. ...improve their research skills.						
22. ...improve their public speaking skills.						
23. ...improve their time management skills.						
24. ...improve their problem-solving skills.						

25. Would you recommend Future City to other families?

- a. Yes
- b. Maybe
- c. No

26. To what extent did Future City meet your expectations this year?

- a. Exceeded my expectations
- b. Fully met my expectations
- c. Partially met my expectations
- d. Did not meet my expectations

THANK YOU!

Appendix C: Educator Survey

Please take a few moments to tell us about your experience with Future City. This information will be used to make the program better, so we appreciate your honesty.

One completed survey will be randomly chosen from your region to receive a \$50 Amazon gift card.

THANK YOU!

In order to be entered in the drawing to win a \$50 Amazon gift card, please provide the following:

1. Your full name: _____
2. Your organization: _____ (Homeschool parents, please write "homeschool")
3. Your email: _____
4. Future City Region [Drop down list]
5. Are you a
 - a. Teacher
 - b. Out-of-school-time (e.g., afterschool) leader
 - c. Homeschool parent or part of a homeschool collaborative
6. (If a) What subjects(s) do you teach? (Choose all that apply)
 - a. Science
 - b. Math
 - c. Technology
 - d. Social Studies
 - e. English Language Arts
 - f. Gifted and Talented
 - g. Other: _____
7. Counting this year, how many times have you participated in Future City? [Choices from 1-20+]
8. How many students in your organization participated in Future City this year?
 - a. 1-6 students
 - b. 7-12 students
 - c. 13-20 students
 - d. 21-40 students
 - e. 41-60 students

- f. 61-80 students
 - g. 81-100 students
 - h. 101+ students
9. How many teams did your organization have this year? [Choices from 1 – 20+]
10. How many of your organization's teams went to the competition this year? [Choices from 1-10+]
11. Did you offer Future City as a part of a class, a club, or some combination?
- a. Part of a class
 - b. Club
 - c. Both
12. Which students participated in Future City this year? (Choose all that apply)
- a. Sixth graders
 - b. Seventh graders
 - c. Eighth graders
 - d. Gifted and talented
 - e. General education
 - f. Special education
13. When did your Future City group meet? (Choose all that apply)
- a. Mostly during school hours
 - b. Mostly after school hours
 - c. Equally during and after school
14. *For the students who went to the competition only*, please estimate the total hours the typical competition-bound student worked on Future City this year, including meetings:
- a. Fewer than 20 hours
 - b. 21-40 hours
 - c. 41-60 hours
 - d. 61-80 hours
 - e. 81-100 hours
 - f. 101+ hours
15. *For the students who did not go to the competition*, please estimate the total hours the typical student worked on Future City this year, including meetings:
- a. Fewer than 20 hours
 - b. 21-40 hours
 - c. 41-60 hours

- d. 61-80 hours
- e. 81-100 hours
- f. 101+ hours

16. Please estimate the number of hours *you* worked on Future City this year, including meetings:

- a. Fewer than 20 hours
- b. 21-40 hours
- c. 41-60 hours
- d. 61-80 hours
- e. 81-100 hours
- f. 101+ hours

17. In addition to Future City, which of the following engineering programs does your organization offer? (Choose all that apply)

- a. FIRST Lego
- b. Guest engineer speakers
- c. Engineering classes
- d. Project Lead the Way
- e. Technology education classes

Next, we'd like to ask you some questions about the impact of Future City on your students.

What new knowledge did your students gain, or what skills did your students improve, by participating in Future City?

<i>Future City helped my students...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
18. ...learn how to plan a project.					
19. ...learn how to execute a project.					
20. ...feel comfortable working in a self-directed manner.					
21. ...learn about the engineering design process.					
22. ...learn about how cities work.					
23. ...learn to be a better citizen.					
24. ...learn how to use engineering to solve real world problems.					
25. ...learn how to apply math and science to real world problems.					

<i>Future City helped my students...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
26. ...improve their ability to work with a team.					
27. ...improve their writing skills.					
28. ...improve their research skills.					
29. ...improve their public speaking skills.					
30. ...improve their time management skills.					
31. ...improve their problem-solving skills.					

Please tell us how much you agree or disagree with the following statements:

	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree
32. The amount of work Future City required was appropriate for my students.					
33. The amount of work Future City required was appropriate for me.					

34. How would you describe your STUDENTS' experience with Future City this year?

- a. It was challenging AND rewarding for my students
- b. It was challenging, but NOT rewarding at all for my students
- c. It was NOT challenging, but it was rewarding for my students
- d. It was NOT challenging, nor was it rewarding for my students

35. How would you describe your own experience with Future City this year?

- a. It was challenging AND rewarding for me
- b. It was challenging, but NOT rewarding at all for me
- c. It was NOT challenging, but it was rewarding for me
- d. It was NOT challenging, nor was it rewarding for me

36. Did you have an engineer mentor this year?

- a. Yes
- b. No
- c. Only part of the time

37. How easy or challenging has it been to make connections between the simulation (SimCity), the essay, and the model?
- Easy
 - Neutral
 - Challenging
38. Did you use the Learning Blocks this year?
- Yes
 - No
 - Did not know about the Learning Blocks
39. Did activities from the learning blocks help your students with the Future City components?
- Yes
 - No
40. Would you recommend Future City to a colleague?
- Yes
 - Maybe
 - No
41. To what extent did Future City meet your expectations this year?
- Exceeded my expectations
 - Fully met my expectations
 - Partially met my expectations
 - Did not meet my expectations

THANK YOU!

Appendix D: Mentor Survey

Please take a few moments to tell us about your experience with Future City. This information will be used to make the program better, so we appreciate your honesty.

One completed survey will be randomly chosen from your region to receive a \$50 Amazon gift card.

THANK YOU!

In order to be entered in the drawing to win a \$50 Amazon gift card, please provide the following:

1. Your full name: _____
2. Organization where you mentored: _____
3. Your email: _____
4. Future City Region [Drop down list]
5. What is your professional background?
 - a. Engineer
 - b. Technician
 - c. City planner
 - d. Project manager
 - e. Architect
 - f. Other
6. (If a) What type of engineer are you? [Drop down list]
7. (If a) Which of the following engineering societies are you affiliated with? [Drop down list]
8. How many years have you been working with kids as a mentor, volunteer, coach or teacher through any organization, including Future City?
9. How many times have you participated in Future City *as a mentor*?
10. Why did you decide to participate in Future City *as a mentor* this year? (Choose all that apply)
 - a. Encourage student interest in STEM
 - b. Asked by a teacher, colleague, friend, etc.
 - c. Enjoy working with students
 - d. Desire to volunteer/mentor
 - e. My own relative (child, nephew/niece) is a participant
 - f. Enjoy the experience, it's rewarding
 - g. Interest in Future City

11. Have you volunteered in any other capacity for Future City?

- a. Judge
- b. Competition volunteer
- c. Organizing committee
- d. Other

12. Please estimate the number of hours *you* worked on Future City this year, including meetings:

- a. Fewer than 20 hours
- b. 21-40 hours
- c. 41-60 hours
- d. 61-80 hours
- e. 81-100 hours
- f. 101+ hours

Thinking about all the students in your group as a whole (not just the students who went to the competition), what new knowledge did your students gain, or what skills did your students improve, by participating in Future City?

<i>Future City helped my students...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree	Not Sure
13. ...learn how to plan a project.						
14. ...learn how to execute a project.						
15. ...feel comfortable working in a self-directed manner.						
16. ...learn about the engineering design process.						
17. ...learn about how cities work.						
18. ...learn to be a better citizen.						
19. ...learn how to use engineering to solve real world problems.						
20. ...learn how to apply math and science to real world problems.						
21. ...improve their ability to work with a team.						
22. ...improve their writing skills.						
23. ...improve their research skills.						

<i>Future City helped my students...</i>	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree	Not Sure
24. ...improve their public speaking skills.						
25. ...improve their time management skills.						
26. ...improve their problem-solving skills.						

Please tell us how much you agree or disagree with the following statements:

	Strongly Agree	Agree	In the Middle	Disagree	Strongly Disagree	Not Sure
27. The amount of work Future City required was appropriate for my students.						
28. The amount of work Future City required was appropriate for me.						

29. How would you describe your STUDENTS' experience with Future City this year?

- a. It was challenging AND rewarding for my students
- b. It was challenging, but NOT rewarding at all for my students
- c. It was NOT challenging, but it was rewarding for my students
- d. It was NOT challenging, nor was it rewarding for my students

30. How would you describe your own experience with Future City this year?

- a. It was challenging AND rewarding for me
- b. It was challenging, but NOT rewarding at all for me
- c. It was NOT challenging, but it was rewarding for me
- d. It was NOT challenging, nor was it rewarding for me

31. To what extent do you agree that Future City represents the field of engineering?

- a. Strongly agree
- b. Agree
- c. Neutral
- d. Disagree
- e. Strongly disagree

32. Would you recommend being a Future City mentor to a colleague?

- a. Yes
- b. Maybe
- c. No

33. To what extent did Future City meet your expectations this year?

- a. Exceeded my expectations
- b. Fully met my expectations
- c. Partially met my expectations
- d. Did not meet my expectations

THANK YOU!