FIRST in Texas Education

Overview Deck

FIRST

FIRST LEGO LEAGUE | FIRST TECH CHALLENGE | FIRST ROBOTICS COMPETITION

FIRST® is ...

... a robotics community preparing
young people for the future

FIRST IN TEXAS | FIRST LEGO LEAGUE | FIRST TECH CHALLENGE | FIRST ROBOTICS COMPETITION

The *FIRST*® Mission

To inspire young people to be science and technology leaders and innovators, by engaging them in exciting mentor-based programs that build science, engineering, and technology skills, that inspire innovation, and that foster well-rounded life capabilities including self-confidence, communication, and leadership.

Over 2.5 million youth reached globally in 30+ years

FIRST is a Robotics Community Preparing Young People for the Future

Together with our sponsors, partners, mentors, and volunteers, we're able to accomplish great things:

BUILDING YOUR FUTURE WORKFORCE

Thrilling, team-based robotics competitions equip students with STEM workforce skills and instill self-confidence

BUILDING A COMMUNITY OF GLOBAL CITIZENS

An inclusive community and powerful mentorship relationships empower young people to think big and look forward

BUILDING A BETTER FUTURE

We inspire young people to channel their raw curiosity and seek ways to improve the world around them

Our Goal

Ensure a broad range of opportunities for participants across learning environments

GAME PLAY:
Fun, thematic robot game challenges to enhance engineering and teamwork skills

INNOVATION:
Real-world innovation opportunities designed to test problem-solving skills and make a community impact

CAREERS:
Career exploration, mentorship, and scholarship* opportunities for fostering personal and professional development

COMMUNITY:
Young people, and the adults who mentor and support them, are part of our thriving, inclusive global robotics community

RECOGNITION:
Opportunities to celebrate and be recognized for achievements

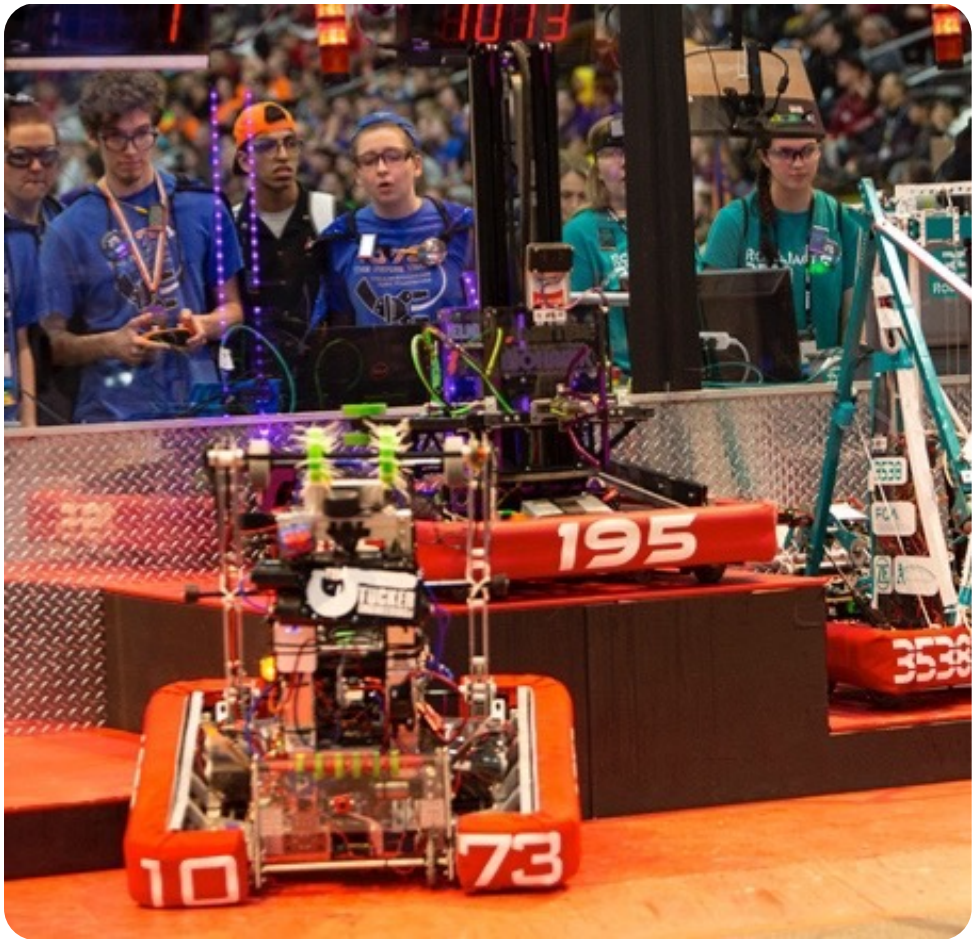
*Scholarships available for current and past high school *FIRST* participants

FIRST ROBOTICS COMPETITION

GRADES 9-12

- Teams compete with 125-pound robots, combining the excitement of sport with the rigors of science and technology.
- Action-packed themed field game is played in an alliance format.
- Each team develops a brand, raises funds to meet its goals, and works to promote STEM in the local community.

Watch *FIRST* Robotics Competition in action



FIRST TECH CHALLENGE

GRADES 7-12

- Teams design, build, and program robots, develop strategy, and engage in thrilling, head-to-head competition.
- Robot kit is reusable year-to-year and coded in a variety of languages.
- Students are guided by adult coaches and mentors, develop STEM skills, practice engineering principles, and realize the value of innovation and teamwork.

Watch *FIRST* Tech Challenge in action

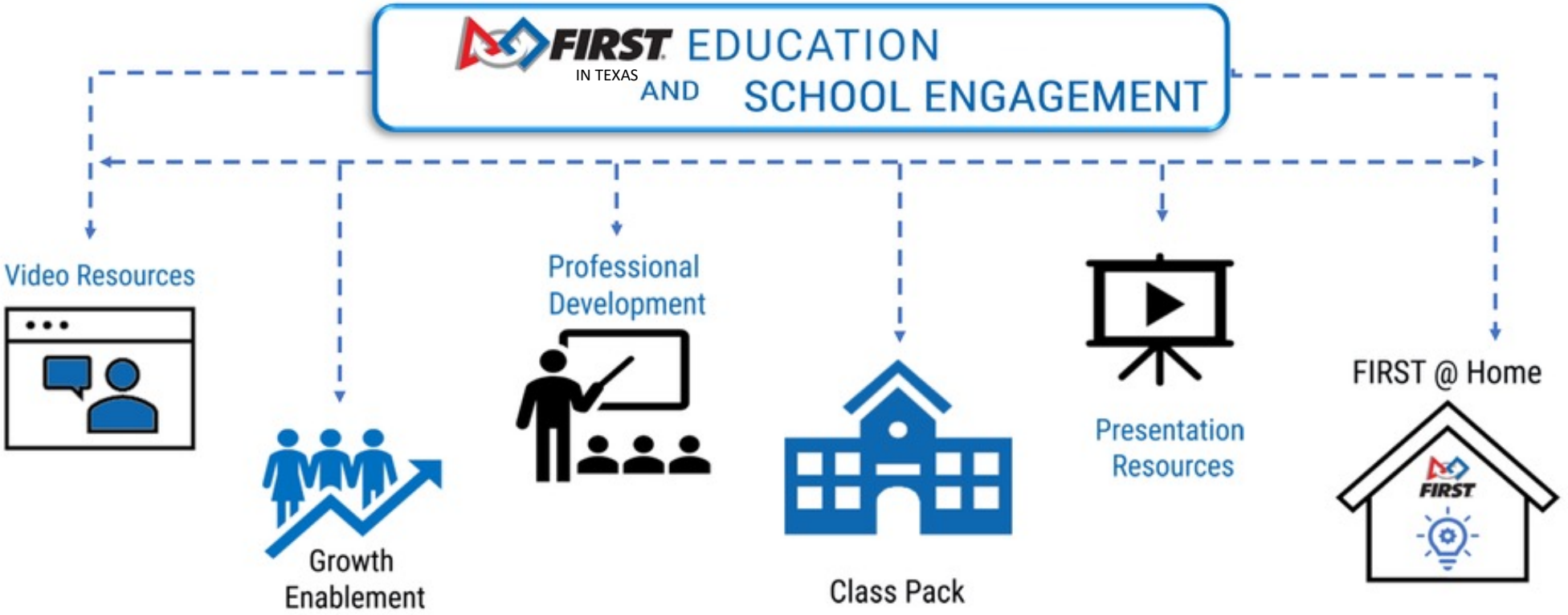
FIRST LEGO LEAGUE

GRADES PreK-7

- Students engage in hands-on STEM experiences using LEGO® Education bricks and technology, building habits of learning, confidence, and teamwork skills along the way.
- Three age-appropriate divisions inspire youth to experiment and grow their critical thinking, coding, and design skills:
  - Discover for ages 4-6, grades PreK-1 (Class Pack only)
  - Explore for ages 6-10, grades 2-4
  - Challenge for ages 9-16,* grades 4-8

Watch *FIRST* LEGO League in Action

*Ages vary by country


FIRST IN TEXAS EDUCATION AND SCHOOL ENGAGEMENT
Video Resources
Growth Enablement
Professional Development
Class Pack
Presentation Resources
FIRST @ Home
FIRST

FIRST® Equity, Diversity & Inclusion

OUR GOAL: Diversity across all *FIRST* programs = Diversity of population

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Our Strategy

Remove barriers, increase opportunities

INCREASING CAPACITY

Dedicated Staff:
HQ & VISTAs

Advisory Committees

BUILDING SKILLS AND RESOURCES

Inclusion training for adults and youth

Resources on engaging girls, students with disabilities, & the LBGTQ+ community

ENGAGING YOUTH WHERE THEY ARE

STEM Equity Community Innovation Grants

Collaborating with Youth-serving Organizations

Your Future Workforce

Three Key Concerns:

QUANTITY — Will there be a sufficient pipeline of skilled workers, especially in the Science, Technology, Engineering, and Math (STEM) fields?

QUALITY — Will they have the necessary knowledge, skills, and abilities to contribute and be leaders in technology and innovation?

DIVERSITY — Will they reflect and represent the entire community and customer-base they serve?

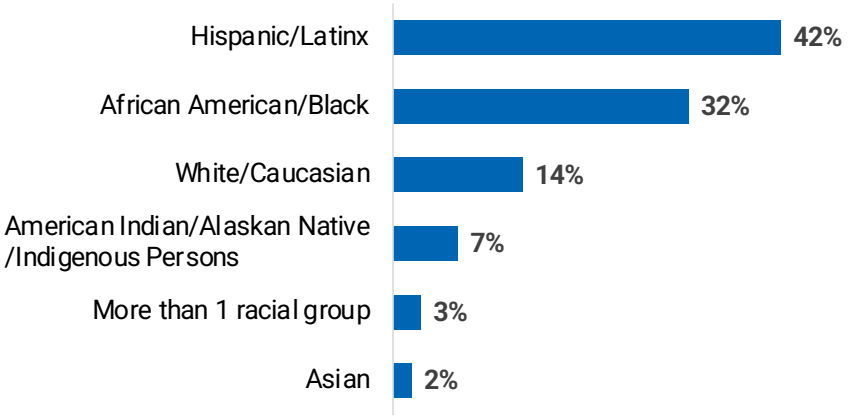
Key Initiatives Spotlight

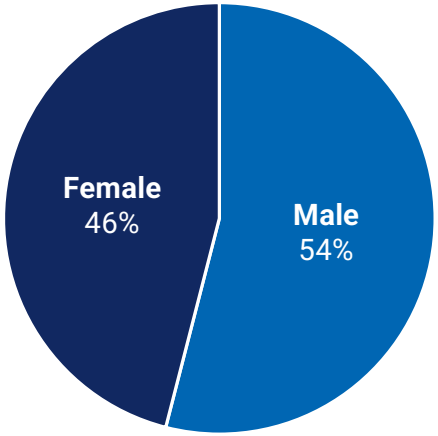
STEM Equity Community Innovation and Youth Serving Organization Grants

Although the COVID-19 global pandemic interrupted almost all teams, emerging outcomes show a trend toward gains in:

- **STEM Interest**
- **Leadership Skills**
- **Sense of Belonging**
- **Problem Solving**

93% of the 3,167 youth reached* were **eligible for free** or **reduced lunch**





"You are able to see students take on leadership skills with building and designing that you may not normally see in a regularly designed classroom."

— *FIRST* Coach

*FY2020 data. FY2021 data available in the fall.

FIRST in Texas – We Have Grants to Help You!

www.FIRSTinTexas.org/grants

Impact

FIRST Longitudinal Study: 2021 Update

www.FIRSTinspires.org

FIRST LEGO LEAGUE

FIRST TECH CHALLENGE

FIRST ROBOTICS COMPETITION

The Lasting Impact of *FIRST*

FIRST Longitudinal Study

- The *FIRST* Longitudinal Study provides evidence that *FIRST* is having lasting impact on participating students
- 84 months of data collection confirms prior findings
- Participants from communities who have been historically underrepresented in STEM are having gains in STEM outcomes and impact; gains continue to be greater for girls and young women in *FIRST*
- STEM interest and attitudes are transforming into behaviors and actions beyond high school where the majority of *FIRST* participants are majoring in STEM

"*FIRST* changed who I was. Made me passionate about something for the first time in my life. Made me develop my work ethic. Gave me extremely valuable leadership experience."

"*FIRST* has helped me to see opportunities to learn and problem solve in all aspects of my life and to encourage others to do the same. Also not being afraid to fail and accepting that I will make mistakes, but that means the opportunity to learn from these is so much greater. That is the biggest impact *FIRST* and its mentors has had on me."

Key Findings

FIRST students are prepared for greater success in the classroom and workforce.

Interest, rather than academic proficiency, is a greater predictor of children pursuing studies and careers in STEM fields. Our evidence-based programs use strategies known to increase student interest and engagement in science, technology, engineering, and math (STEM), including:

Hands-on learning

Working as a team on real-life problems

Exposure to careers and adult mentors

Emphasis on *FIRST* Core Values

Culminating celebration where students can showcase what they created and learned

An Increase in STEM-Related Attitudes

84 months after enrollment, *FIRST* students are still roughly two times more likely to show an increase in STEM-related attitudes than comparison group students.

1.8x	2.1x	1.9x	1.9x	2.2x
STEM Knowledge	**STEM Identity**	**STEM Careers**	**STEM Activity**	**STEM Interest**

Learn more at firstinspires.org/impact

All results are statistically significant at p≤.05. Estimated impacts are based on the difference between STEM scale scores at baseline and 84 months. Controlling for Gender, Race, Honors Courses, Family Income, and Parental Support for STEM

Key Findings

Female *FIRST* STEM Outcomes

Female *FIRST* participants are 2.2 times more likely to have significantly stronger STEM interest than comparison group peers, and are more likely to have significantly stronger outcomes in STEM attitudes, knowledge, and interests compared to their peers

3.2x	2.2x	2.1x	1.9x	1.4x
STEM Activity	**STEM Interest**	**STEM Knowledge**	**STEM Careers**	**STEM Identity**

Female *FIRST* STEM Pathways

Female *FIRST* alumni are more likely to pursue STEM pathways through 4 years of college compared to their peers in the comparison group:

MORE LIKELY TO TAKE COURSES IN:

2.6x	3.4x
Engineering	**Computer Science**

MORE LIKELY TO HAVE DECLARED A MAJOR IN:

2.5x	3.7x
Engineering	**Computer Science**

Learn more at firstinspires.org/impact

All results are statistically significant at p≤.05. Estimated impacts are based on the difference between STEM scale scores at baseline and 84 months. Controlling for Gender, Race, Honors Courses, Family Income, and Parental Support for STEM

STEM Outcomes and Attitudes *FIRST* Longitudinal Study

— PART OF THE APPENDIX —

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Key Findings: Proof of Long-Term Impact of *FIRST* Participation

Sustained Attitudes and Interest in STEM:

- Positive impacts on STEM-related attitudes and interests seven years after entering the program. Those impacts are evident across all major population groups and persist into college.

Persistence in STEM in College:

- *FIRST* alumni are significantly more likely to pursue college pathways into Engineering and Computer Science than comparison students. They are more likely to be interested in majoring in computer science, engineering, and robotics; to take computer science and engineering courses, and to declare a major in computer science or engineering. By year 4, 81% declare a major in STEM; 68% in engineering or computer science.

Sustained attitudes and persistence for female *FIRST* Alumni:

- Female *FIRST* alumni continue to show significant impacts, including impacts on STEM attitudes, interest in computer science and engineering majors, course-taking, and declared majors in computer science and engineering. In most cases, the gains for females were significantly larger than those for males.

Positive Impacts in Historically Underrepresented Communities

Positive significant impacts are evident for *FIRST* students who are from communities historically underrepresented in STEM

Outcomes	Girls and Young Women	Economically Disadvantaged	Underrepresented Racial Groups	Urban	Rural
STEM Interest	+	+	+	+	+
STEM Activity	+	+	+	+	+
STEM Careers	+	+	+	+	+
STEM Identity	+	+	[+]	+	+
STEM Knowledge	+	+	+	+	+

Note: + indicates a positive, significant impact at p≤ .05, ([+] at p<.10). Impacts are relative to comparable subgroups in the comparison population (for example, *FIRST* female participants compare to female comparison group members). Economically disadvantaged is defined as those whose family income is below $50,000 Underrepresented Racial Groups include Black or African-American, Native American, Hawaiian/Pacific Islander, and Multi-Racial. The number of youth who responded as non-gender-binary was too small for analysis.

College Outcomes
FIRST Longitudinal Study

— PART OF THE APPENDIX —

FIRST

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FIRST Alumni

By their fourth year of college, compared to the comparison group, *FIRST* alumni are:

	ENGINEERING	COMPUTER SCIENCE
More likely to be **"highly interested"** or to have already declared **Engineering** and **Computer Science majors**	1.9x	3.5x
More likely to take **Engineering** and **Computer Science courses**	2.5x	3.2x
More likely to have declared an **Engineering** or **Computer Science major**	2.4x	3.5x

All differences statistically significant, $p \leq .05$.

Female *FIRST* Alumni

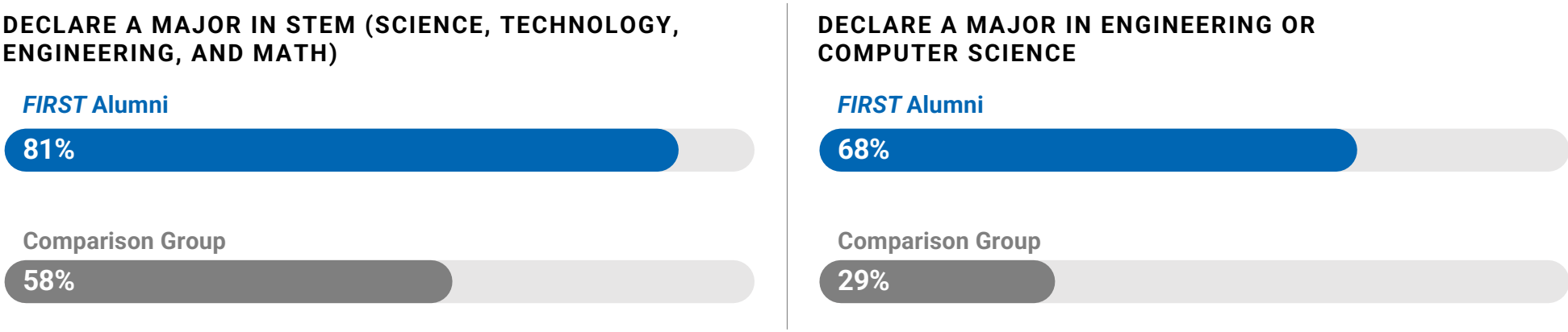
By their fourth year of college, compared to their peers, female *FIRST* alumni are:

	ENGINEERING	COMPUTER SCIENCE
More likely to be **"highly interested"** in **Engineering** and **Computer Science majors**	3.3x	3.8x
More likely to take **Engineering** and **Computer Science courses**	2.6x	3.4x
More likely to have **declared a major** in **Engineering** or **Computer Science**	2.5x	3.7x

All differences statistically significant, $p \leq .05$.

FIRST Alumni

By their fourth year of college, *FIRST* alumni are more likely to be majoring in STEM fields than comparison group peers

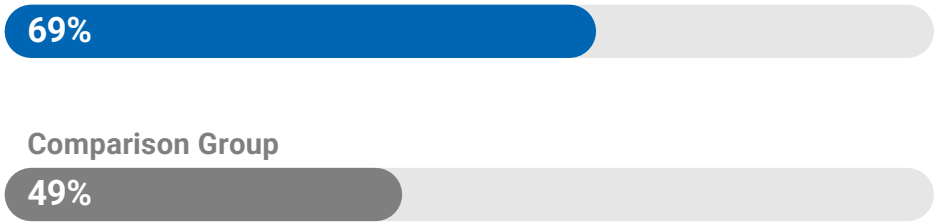


Data represents those who declared a major years 1-4 of college. All differences statistically significant, $p \leq .05$.
STEM fields include: biology, computer science, engineering, health professions, mathematics, physical sciences, vocational/ technical fields, and robotics.

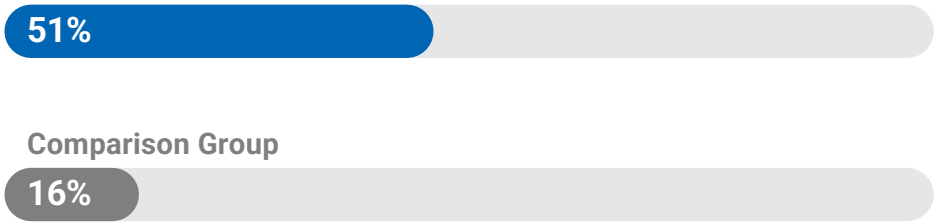
Female *FIRST* Alumni

Female *FIRST* alumni are more likely to pursue STEM pathways through four years of college compared to their peers in the comparison group:

% OF FEMALE *FIRST* ALUMNI WHO DECLARE A STEM MAJOR COMPARED TO THEIR PEERS



MORE LIKELY TO DECLARE A MAJOR IN ENGINEERING OR COMPUTER SCIENCE THAN THEIR PEERS



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FIRST Longitudinal Study Background

Conducted by Brandeis University, Center for Youth and Communities

Focused on *FIRST*® LEGO® League Challenge, *FIRST*® Tech Challenge, and *FIRST*® Robotics Competition

Brandeis | THE HELLER SCHOOL FOR SOCIAL POLICY AND MANAGEMENT
Center for Youth and Communities

Evaluation Questions:

- What are the short- and long-term impacts of the *FIRST* Robotics Competition, *FIRST* Tech Challenge and *FIRST* LEGO League programs on program participants?
- What are the impacts on college and career trajectories of *FIRST* alumni?
- To what extent are there differences in experiences and impacts among key sub-populations of *FIRST* participants?

Quasi-Experimental Design:

- Sample: new students in *FIRST* and a comparison group of peers from same schools as the *FIRST* Students – tracked over multiple years
- Data Collection: Baseline and annual follow up surveys; interviews, focus groups supplement survey data
- Statistical analysis: controls for baseline differences in gender, race, income, parental support for STEM, and baseline involvement and interest in STEM among the *FIRST* participants and comparison group

Sample at 84 months: 74% response rate

- 554 *FIRST* participants (67% of baseline)
- 389 Comparison group (86% of baseline)
- 80% of the sample is out of high school (college, graduate school, career)

Workforce Skills

— PART OF THE APPENDIX —

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FIRST students have positive outcomes in workforce skills

Learn more at firstinspires.org/impact **Texas Specific Impact Data: www.FIRSTinTexas.org/impact**

90% in **communication** skills

93% in **conflict resolution** skills

95% in **time management** skills

94% in **problem-solving** skills

***FIRST* STUDENTS BUILD TEAMWORK, CORE VALUES, AND PERSEVERANCE SKILLS**

"*FIRST* has given me life skills and tools to work well with others and be a team player and always do my personal best with *Gracious Professionalism*®. These are skills I will use in my daily life and beyond!"

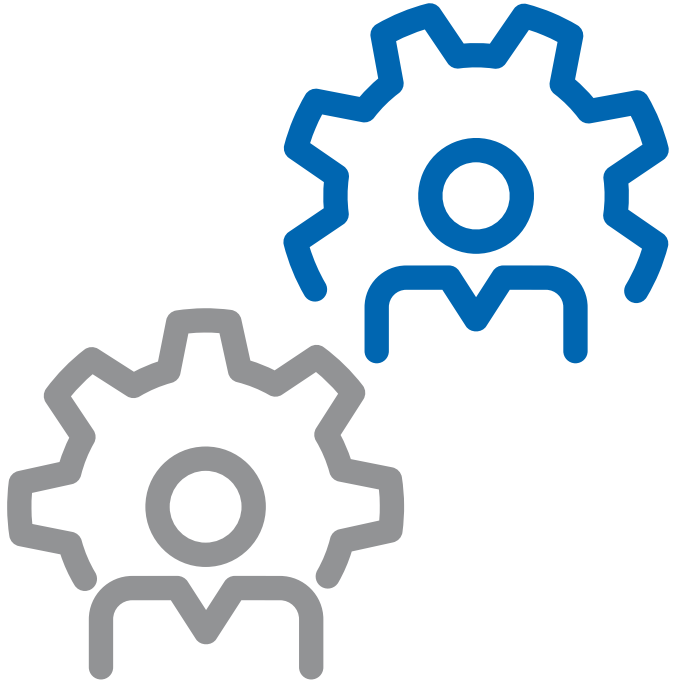
Sources: Brandeis University, 2011 *FIRST*® Tech Challenge – *FIRST*® Robotics Competition Evaluation and 2013 *FIRST*® LEGO® League Evaluation

FIRST students have workforce outcomes such as teamwork, communication, and problem-solving

84%+ Understanding of the role of ***Gracious Professionalism***®

95%+ **Persevere** despite challenges or barriers

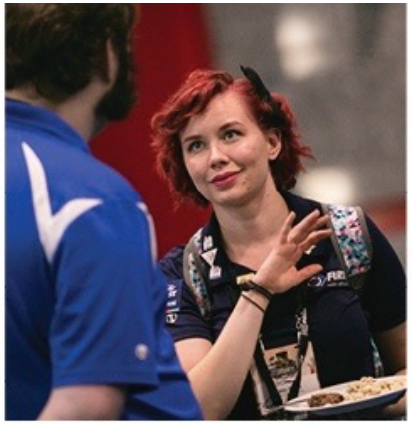
95%+ **Accept input** and **feedback** from others



Sources: 2020 *FIRST* end-of-season surveys for *FIRST*® LEGO® League, *FIRST*® Tech Challenge, and *FIRST*® Robotics Competition

Coopertition® — all *FIRST* programs in action

Alumni engagement scholarship providers, internship interviews, career development



Inspiration from STEM leaders and each other

Innovation hands-on interaction and exploration

Celebration with *FIRST* fans