



Our Future:
Built Better Together



What is FIRST

Georgia Everett, Western High School

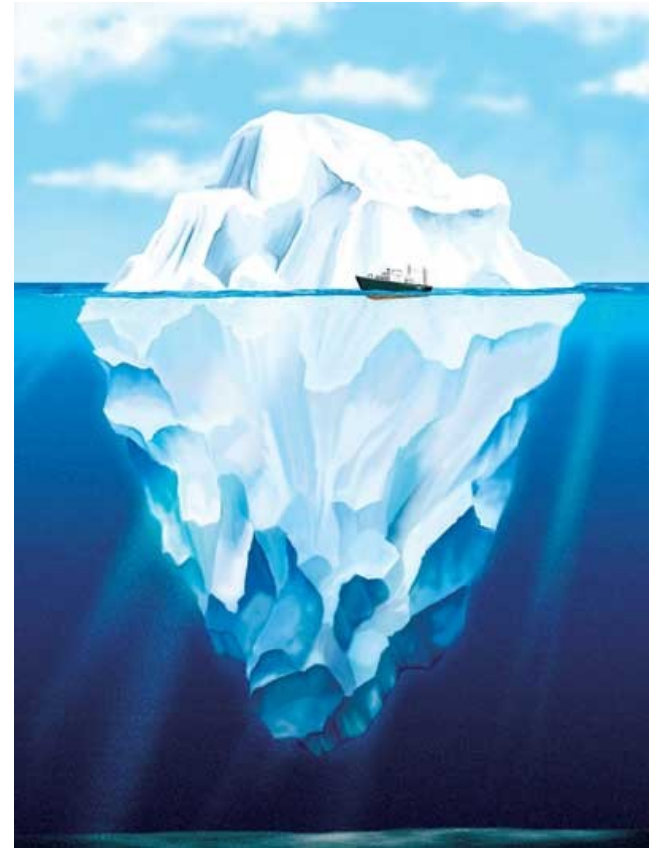
Chris Osborne FIRST in Indiana

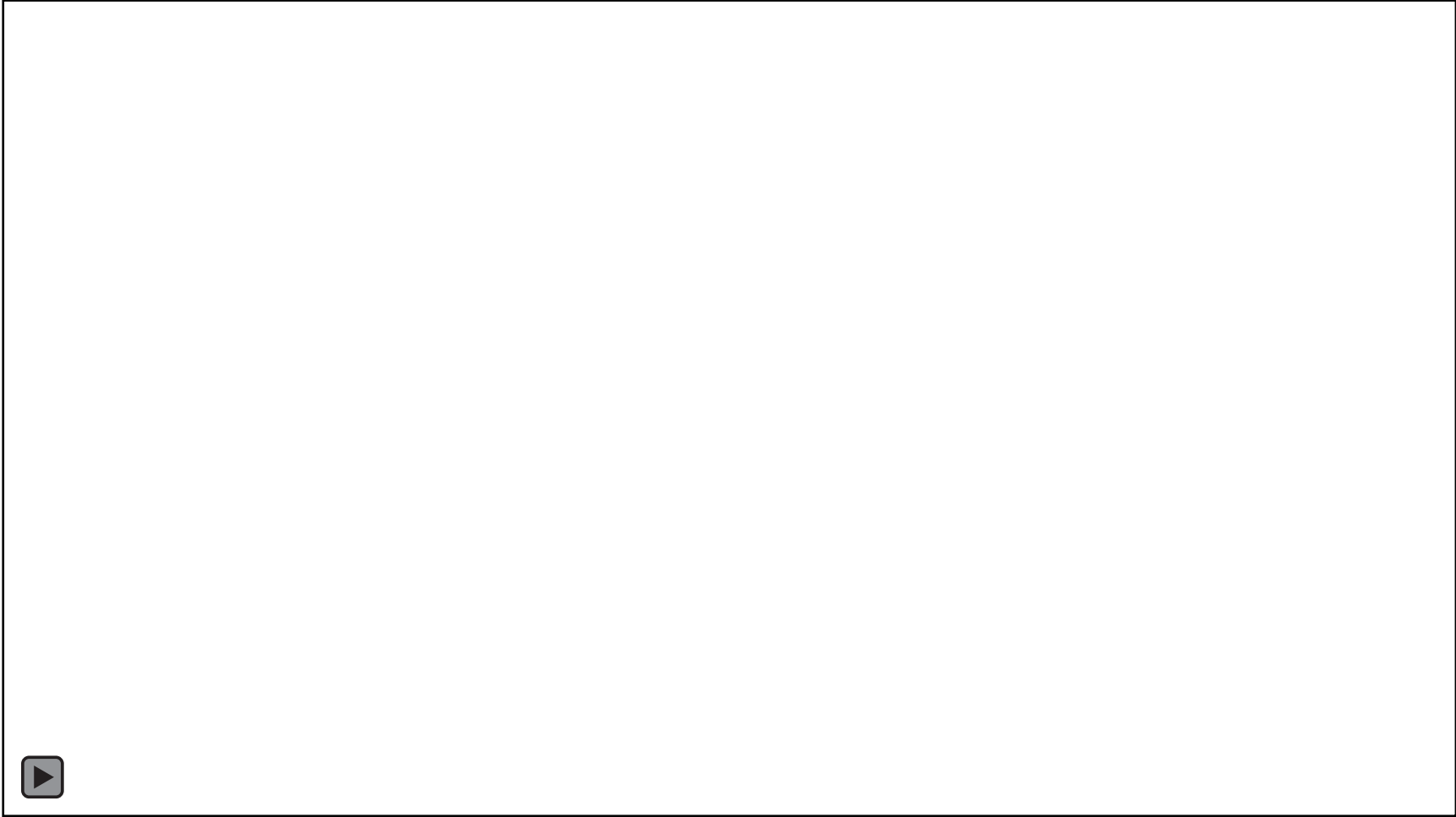


Our Future:
Built Better Together

FIRST® Impact: More than Robots

- *STEM Awareness, Skills and Intent*
 - Increase the number of youth who pursue post-secondary education and careers in STEM-related fields and industries resulting in a STEM workforce.
- *Innovation and Entrepreneurship*
 - Inspire youth to become leaders and innovators in their field & society
- *21st Century Work-Life Skills*
 - Enable youth to develop valuable, real-world skills applicable to all career choices and outcomes
 - Ethos of Gracious Professionalism® and Coopertition®





FIRST[®]

...the only sport where *everyone* who plays can turn pro

533K+

Students on 59K teams
in **86 countries**

250K

mentor, coach, judge,
and volunteer roles

18M

volunteer hours
served

> \$81M+

scholarship opportunities
from nearly **200**
providers

2,900+

events in nearly
70 countries

> 70K

participants at annual
FIRST[®] Championship

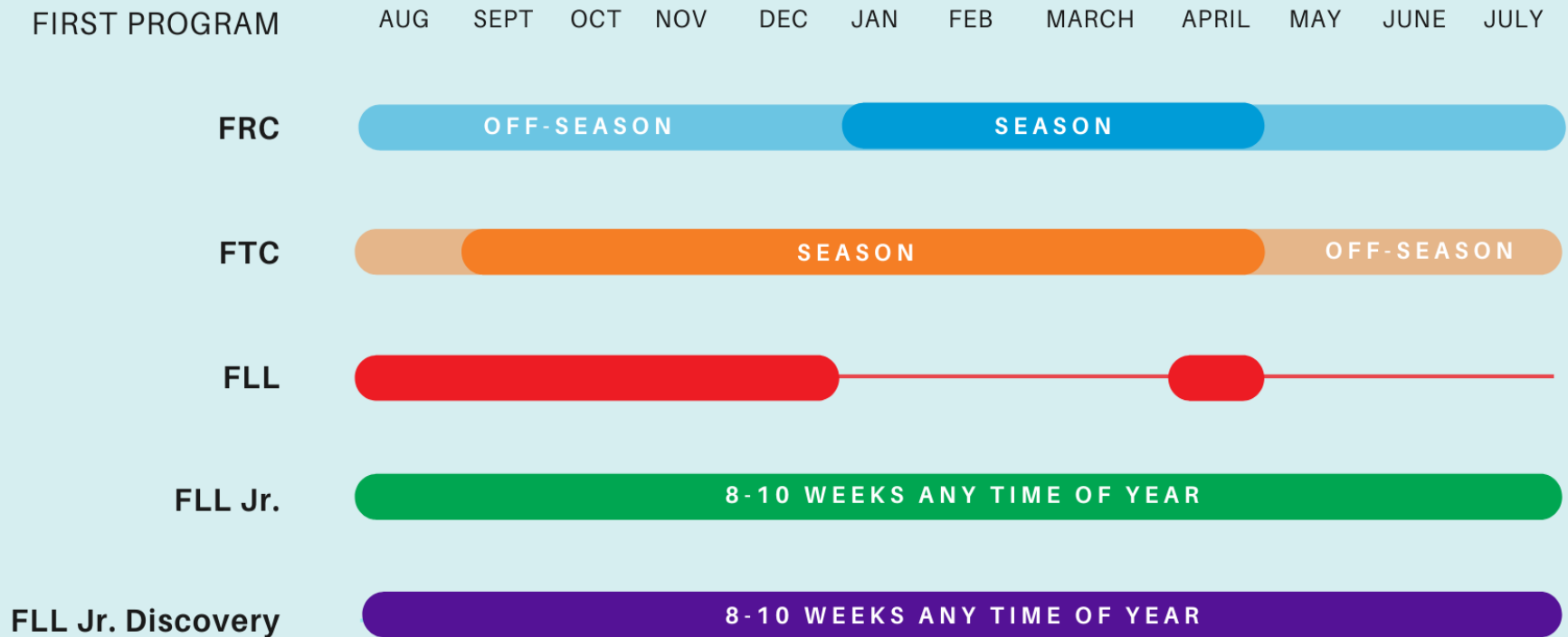
Indiana Higher Education Scholarship Providers

FIRST Participation Required



FIRST CALENDAR OF PROGRAMS

2020/2021 Season



Students Build Progressive Coding Skills

FIRST LEGO LEAGUE JR.

Ages 6-9 (Grades K-4)



Icon-based, drag and drop, introduction to programming logic. Classroom-friendly software utilizing integrated Bluetooth technology.

MINISTORMS
EV3



Icon-based, drag and drop introduction to programming logic that controls motors and collects sensor feedback using intuitive programming and data logging software.

FIRST LEGO LEAGUE

Ages 9-16 (Grades 4-8)*

*Ages vary by country

FIRST TECH CHALLENGE

Ages 12-18 (Grades 7-12)



Scratch-based graphical app development or full Java programming. Teaches basic programming logic, app development, and text-based language programming used in most high school AP classes.

FIRST ROBOTICS COMPETITION

Ages 14-18 (Grades 9-12)



Three programming options — LabVIEW, an icon-based language teaching programming logic and structure; C++, one of the most popular text-based languages; and Java, also a text-based language used in most high school AP classes.



FIRST® LEGO® League Jr.

Ages 6-10 (Grades K-4)

Teams of up to 6 kids build interest in science with a real-world scientific challenge solved by guided research and imagination.

FIRST® LEGO® League Jr.

FIRST® LEGO® League Jr. features a real-world scientific concept to be explored through research, teamwork, construction, and imagination. Guided by adult coaches, teams use LEGO® Education WeDo to build and program a model that moves and develop a *Show Me Poster* to illustrate their journey.

Annual Season Timeline:

Registration opens ... May

Challenge release ... August

Event season ... October-April

2019-2020 CHALLENGE:



This is a non-competitive program. Students exhibit and celebrate their work at the end.





FIRST® LEGO® League

Ages 9-16* (Grades 4-8)

Teams of 8 (average) kids build LEGO®-based robots and develop research projects based on a real-world scientific challenges.

*Ages vary by country

FIRST® LEGO® League

In **FIRST® LEGO® League**, children are immersed in real-world science and technology challenges. Teams design their own solution to a current scientific question or problem and build autonomous robots using LEGO® MINDSTORMS® technology that perform a series of missions based on an annual theme.

Annual Season Timeline:

Registration opens ... May

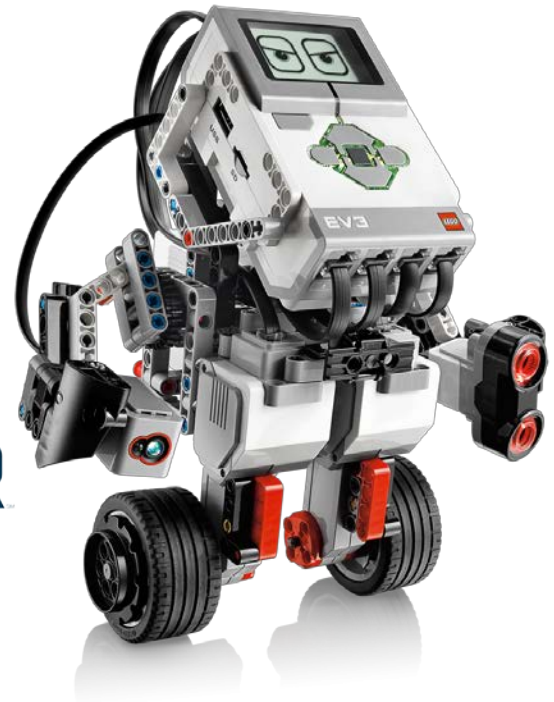
Challenge release ... August

Event season ... November-April

2019-2020 CHALLENGE:



**CITY
SHAPER**

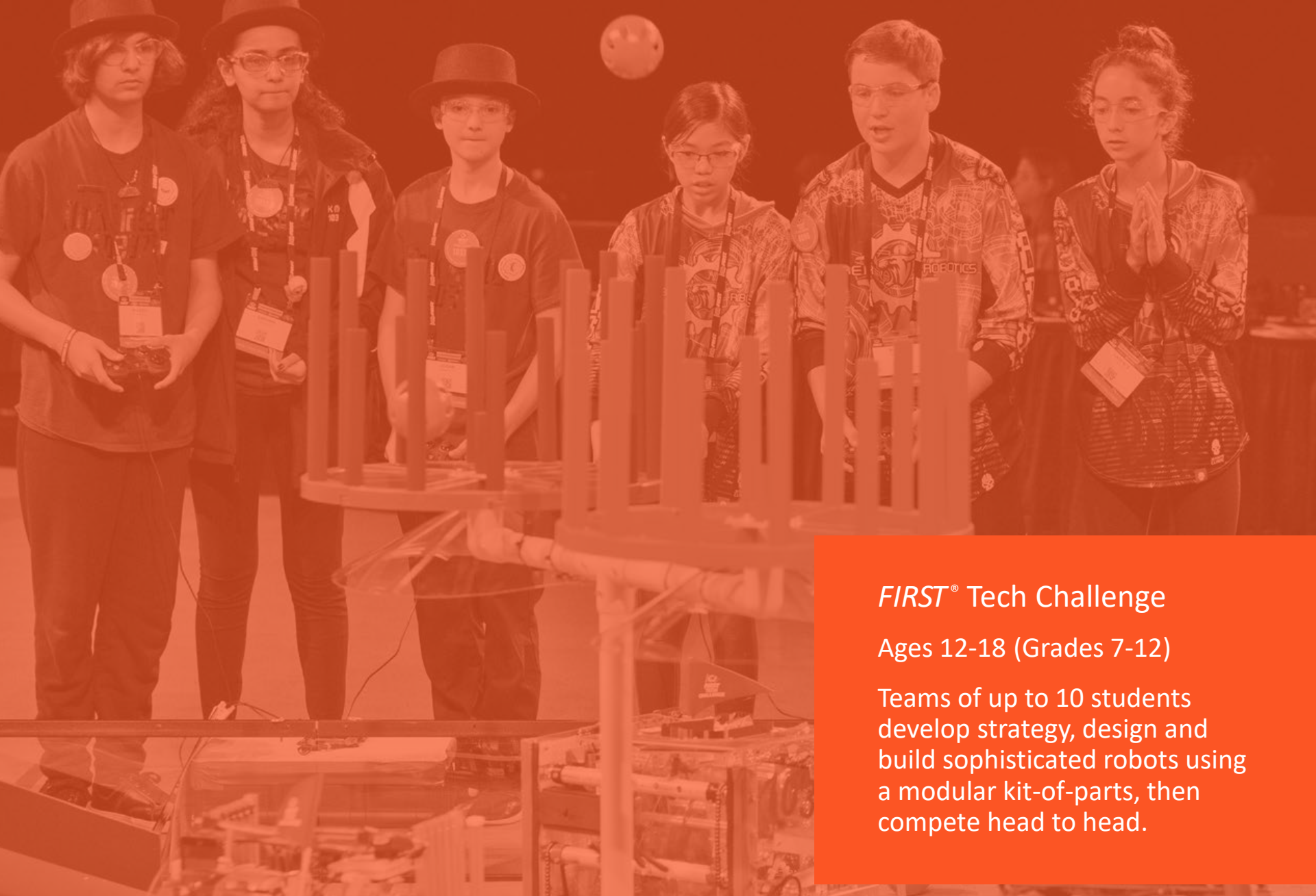






FLL 4 x 8 Table





FIRST® Tech Challenge

Ages 12-18 (Grades 7-12)

Teams of up to 10 students develop strategy, design and build sophisticated robots using a modular kit-of-parts, then compete head to head.

FIRST® Tech Challenge

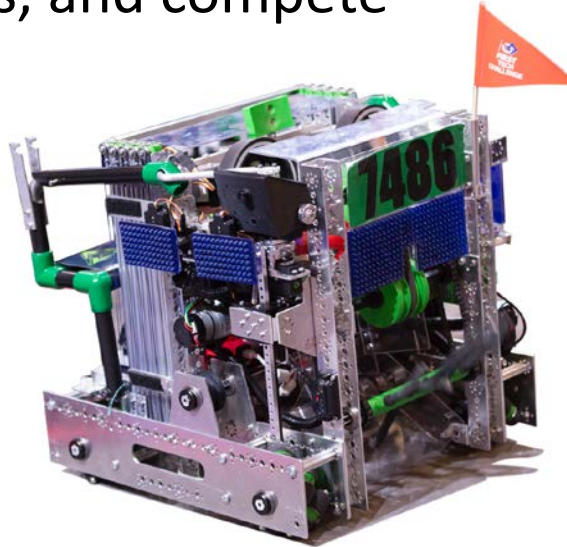
FIRST® Tech Challenge students learn to think like engineers. Teams design, build, and program robots from a reusable platform, powered by Android technology, and programmed using Java or Blockly. They develop strategies, document their progress, and compete head to head.

Annual Season Timeline:

Registration opens ... May

Challenge release ... September

Event season ... November-April



2019-2020 CHALLENGE:



FIRST Tech Challenge Impact

21ST CENTURY
WORK-LIFE SKILLS



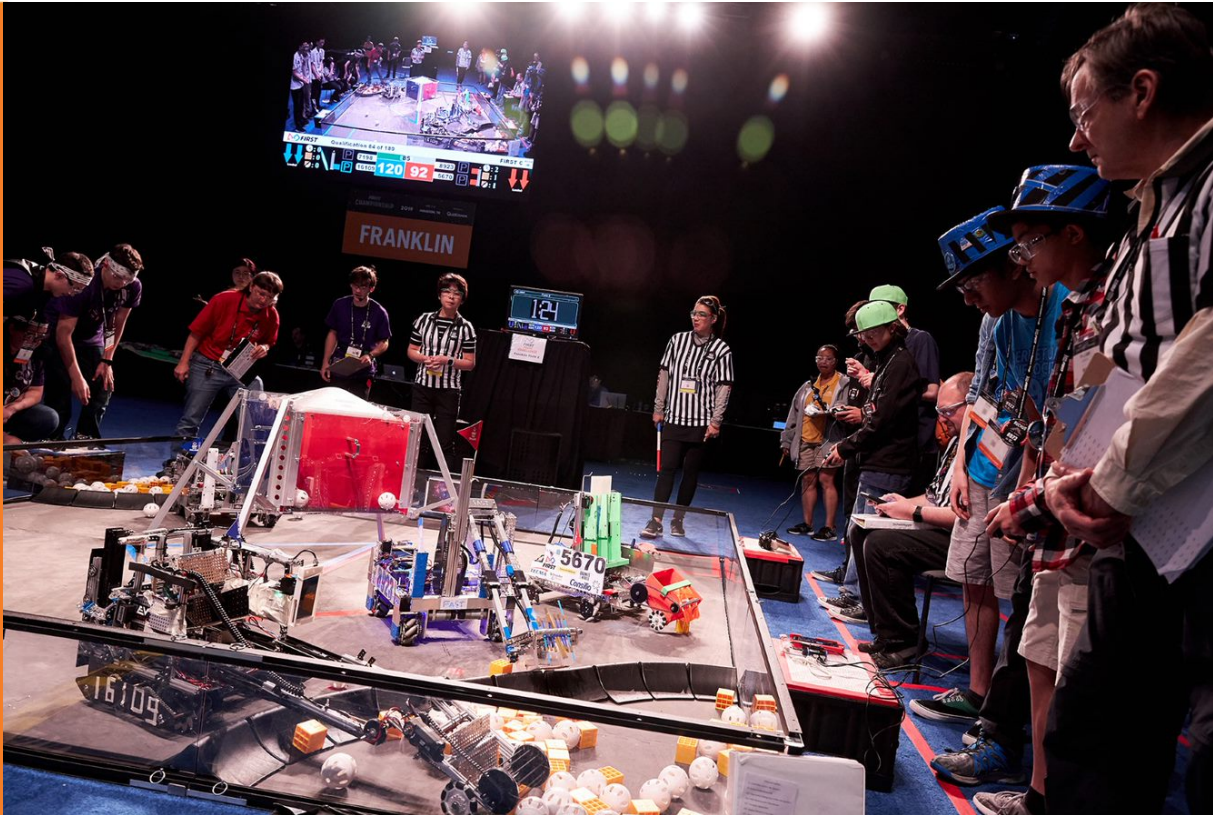
85%
Self confidence



100%
Team work



93%
Solve disagreements



LEADERSHIP, INNOVATION,
ENTREPRENEURSHIP



92%
Increased
leadership skills



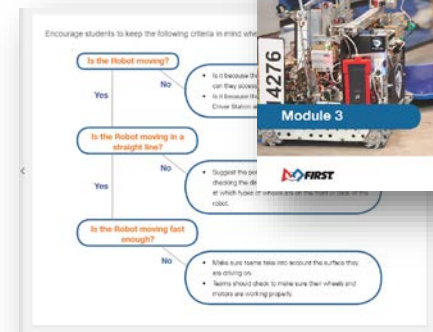
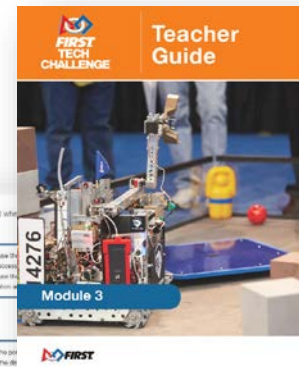
88%
Use math to solve a
real world problem



98%
Solve unexpected problems

FIRST Tech Challenge Curriculum

- Semester course; 7 modules
- Real-world, project-based learning
- Available with class pack purchase
- Targeted for in-classroom use
- Available within *FIRST* custom Thinkspace portal
- Digital content or PDF option
- Mini-game version of season's challenge
- Uses a simplified Education version of the REV Competition kit



FTC and FLL educator courses within Schoology will be archived by end of year and not updated with this season's challenge information.

FIRST® Robotics Competition

FIRST® Robotics Competition is as close to real-world engineering as a student can get. Working alongside professional engineers, in just six weeks, teams hone teamwork skills, design, build, and program a robot to perform tasks against a field of competitors, create a team “brand,” and raise needed funds.

Annual Season Timeline:

Registration opens ... May

Challenge release ... January

Event season ... February-April

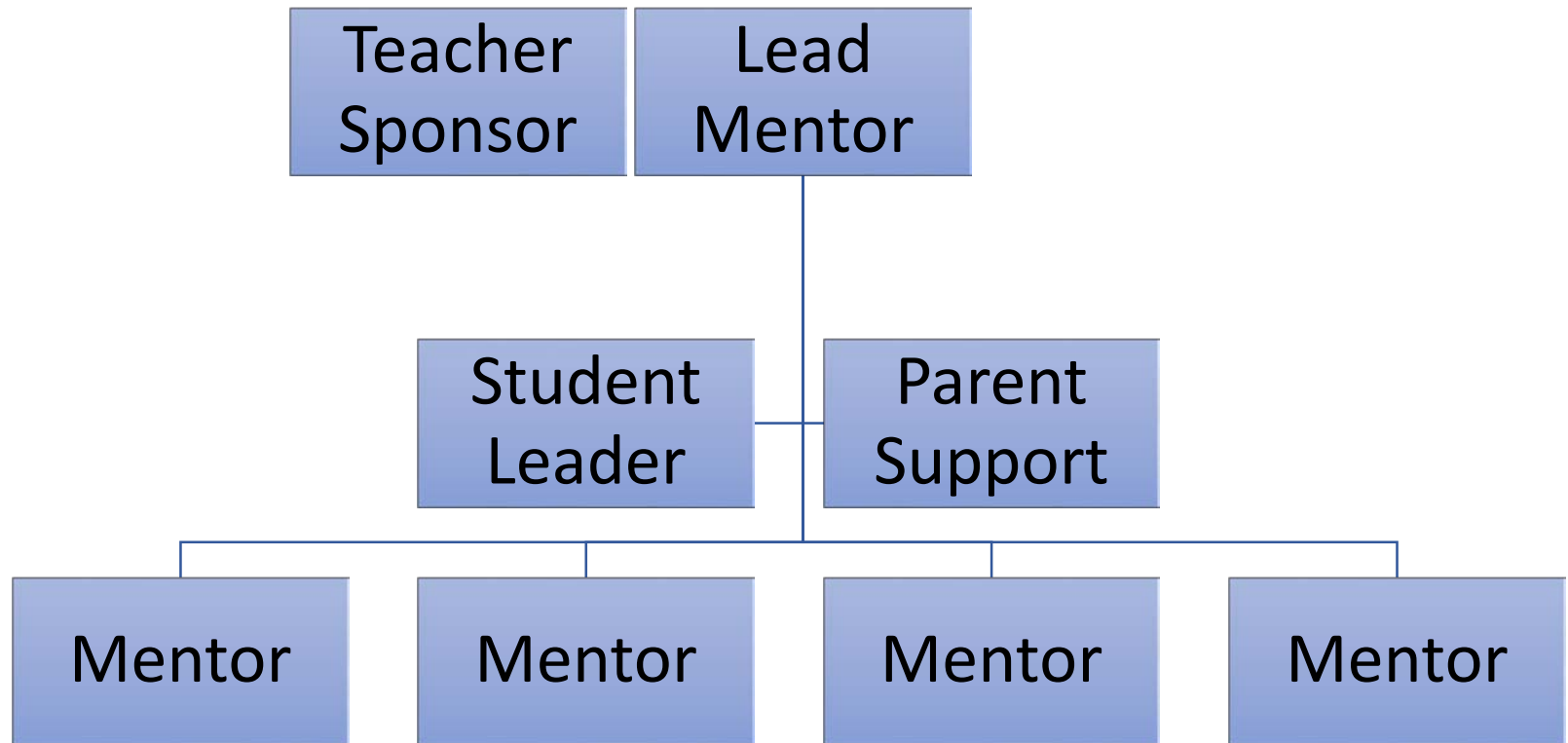


2020 CHALLENGE:

INFINITE RECHARGE



Example Team Structure



Roles on a FIRST Team

Teacher Sponsor

- School Liaison
- Communication with students/Mentors
- Coach or Mentor helps with season to whatever extent is desired.

Parents

- Organize meals during build season.
- Help with transportation (hotels, etc.)
- Help with fundraising.

Mentors

- Engineering
 - Programming
 - Machining
 - PR / Marketing
 - Web Design
 - Graphics
 - Strategy
-
- Mentors put in bulk of time commitment especially during build season and competition season.

FRC / FTC Skills Developed More Than Robots!

Coding

- C++, Java, LabVIEW, Android Blockly, Scratch

Design

- CAD, Solidworks, Inventor

Tools

- Mills, Lathes, Drills, CNC Router, CNC Mill, Allen Wrenches, 3D Printers, other hand tools and power tools as needed.

Soft Skills

- Communication, Public Speaking, Teamwork, Leadership, Inclusion, Fail Forward, Confidence, Career Preparedness

FIRST Impact

School engagement increases for *FIRST* participants...

More interested in
doing well in school

87%

FIRST® LEGO® League

86%

FIRST® Tech Challenge

88%

FIRST® Robotics Competition



Plan to take a more
challenging math or
science course

84%

FIRST® Tech Challenge

90%

FIRST® Robotics Competition

More interested
in going to college

88%

FIRST® LEGO® League

87%

FIRST® Tech Challenge

91%

FIRST® Robotics Competition

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

REV 1/17



FIRST Longitudinal Study: Overview

Multi-year, industry-leading study conducted by Brandeis University focused on *FIRST*® LEGO® League, *FIRST*® Tech Challenge, and *FIRST*® Robotics Competition

Sample: *FIRST* participants: new members on veteran *FIRST* teams (822) and Comparison group: students in math and science classes at same schools (451)

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 is the relationship between program experience and impact? To what extent are differences in experiences associated with differences in impacts among *FIRST* participants?
- To what extent are there differences in experiences and impacts among key sub-populations of *FIRST* participants?

FIRST® Longitudinal Study

48-month Results of Brandeis University-led Study

FIRST participants are significantly more likely to show gains on each of the STEM-related measures in the study than the comparison group.

3.0x

more likely to
show gains in
STEM Interest

2.2x

more likely to
show gains in
STEM Activity

3.0x

more likely to show
gains in **STEM Career Interest**

1.6x

more likely to
show gains in
STEM Identity

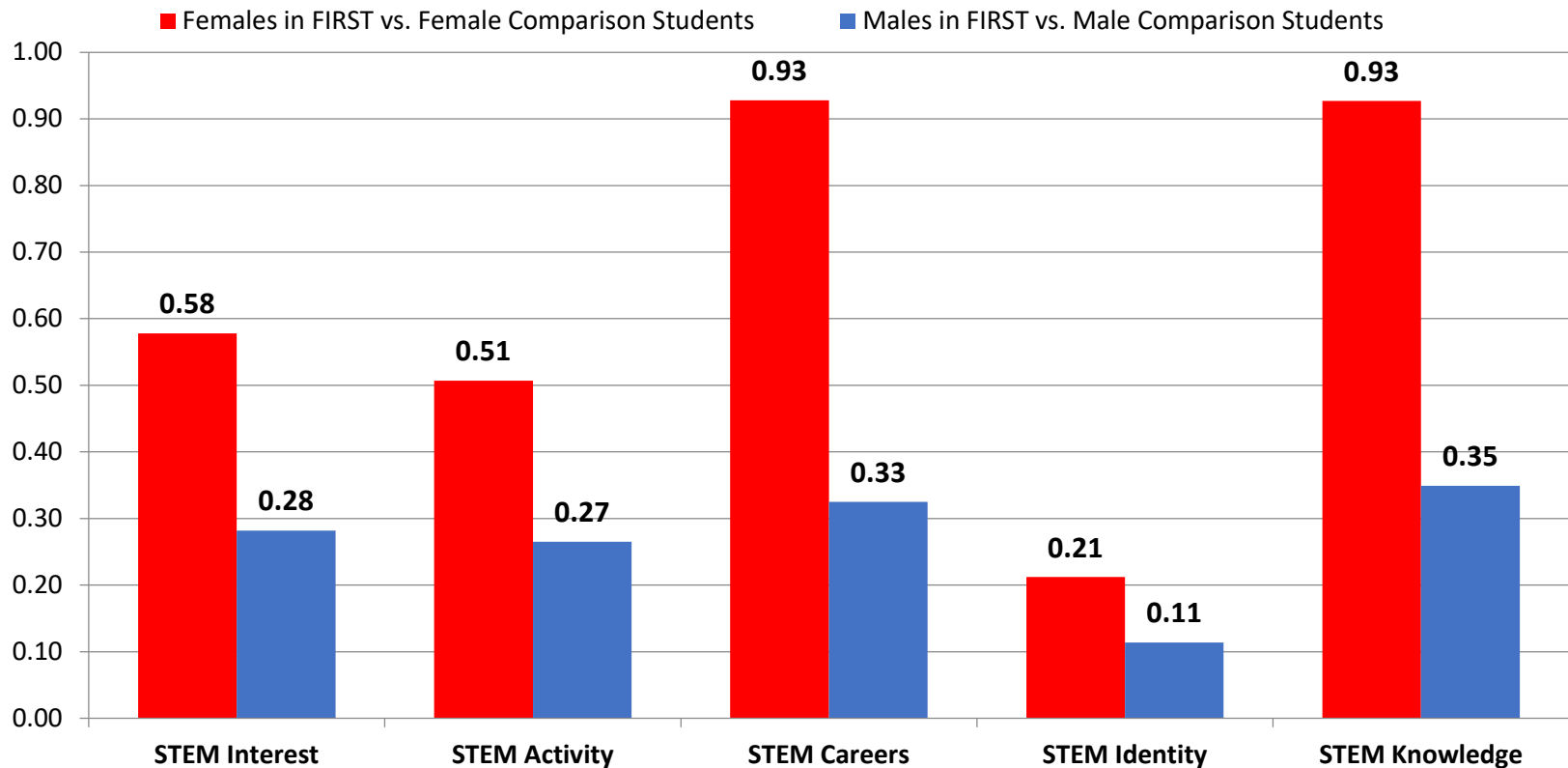
2.4x

more likely to show
gains in **STEM Knowledge**

Note: Impacts are relative to comparable subgroups in the comparison population with similar backgrounds and achievement in high-school math and science.

Girls in *FIRST* continue to show significantly greater impacts on STEM measures than boys

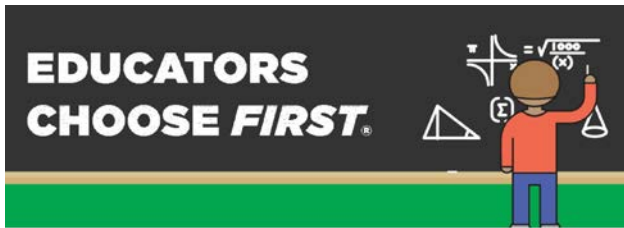
Impacts on STEM-Related Outcomes for Male and Female *FIRST* Team Members



Note: Values on the chart represent the differences in outcomes between *FIRST* participants and students of the same gender in the comparison groups (i.e., the difference in scores between males in *FIRST* and males in the comparison group and between females in *FIRST* and female comparison students). All differences are statistically significant at $p \leq .05$ or less. The impacts for girls in *FIRST* are significantly greater than those for boys.

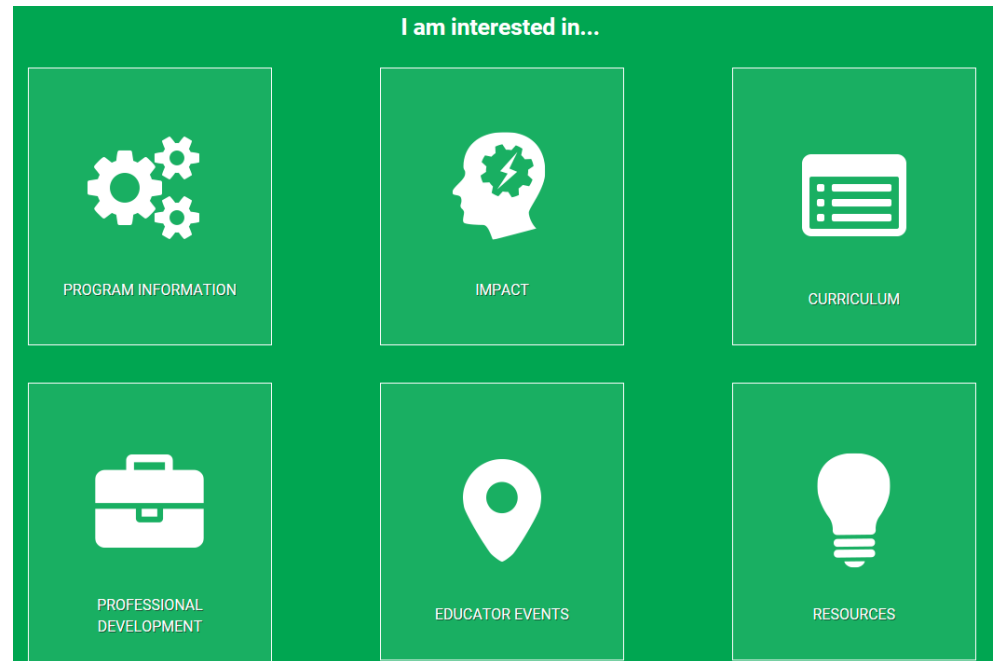
FIRST Inspires Webpage – Educators Page

<https://www.firstinspires.org/community/educators>



Access:

- Curriculum
- FIRST Stories
- Impact Data
- Longitudinal Study
- Educator Events
- CMP Education Conferences
- Contact Education Team



FIRST Professional Development

FIRST LEGO League Jr.

FIRST LEGO League

FIRST Tech Challenge

Participants learn how to facilitate *FIRST* programs and achieve STEM learning objectives

- Two-day, 14 hour training
- Led by *FIRST* Certified Trainers and/or *FIRST* staff
- Customized to meet unique needs of educators
- Educators receive certificates for CEUs

<https://www.firstinspires.org/community/educators>



FIRST Professional Development

2 Options for *FIRST* HQ Certified Professional Development

“You Come to Us”

2019 Regional training sites available for individual attendees

“We Come to You”

FIRST Certified Trainers go on site to deliver training to educators

Quotations for on site training via

<https://www.firstinspires.org/community/educators/professional-development>



Thanks for participating!

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Find this presentation and other resources here:

<https://bit.ly/FINresources>

