



**The impact of FIRST® Robotics Competition on
workforce challenges in Minnesota**

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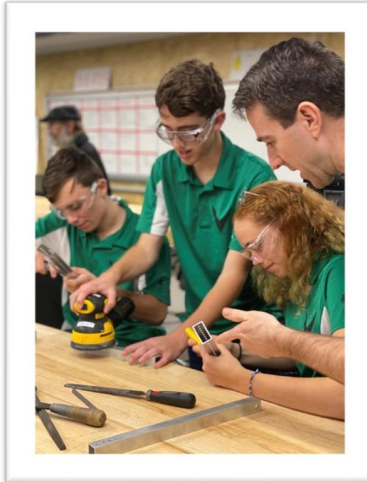
Executive Summary

FIRST Robotics Competition (FRC) is the pinnacle of the FIRST suite of programs, and it's as close to real-world engineering as a student can get. For many of our students, the next step is into one of the many STEM fields available. With a team model that emulates the business world, FRC has proven successful in preparing future employees for STEM careers.

- **Mentor based** programs have been proven to increase high school graduation rates, improve interpersonal skills, foster healthier relationships and lifestyle choices, and result in higher educational aspirations.
- With a focus on emulating a **business structure** within the team, students are workforce ready with skills such as problem solving, analytical skills, verbal communication, self-motivation, and technical skills.
- FIRST graduates are better prepared for the **workforce** based on their comfort and familiarity with technology. With STEM occupations showing approximately 24% growth year after year and businesses increasing their use of robots and AI by 350% by 2025, FIRST graduates will keep businesses on the cutting edge.
- Workers with a **STEM** background earn about 26% more than those without and the STEM unemployment rate is half the national rate.

Between the enormous impact of COVID-19 on Education in Minnesota and the economic challenges facing the Minnesota private sector, the FRC program in Minnesota and many of the 200 previously successful FRC teams are now struggling to stay afloat, STEM initiatives are stalling, and there are fewer opportunities for underrepresented high school students and interested employers to participate in *win-win* internships.

For this reason, the FRC program in Minnesota is requesting funding to assist with increasing the number of adult mentors, strengthening the FIRST Robotics STEM Centers, and increasing access to STEM internships for graduates of FIRST programs.



Minnesota FIRST Robotics Competition

FIRST is a global robotics nonprofit whose mission is 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, inspire innovation, and well-rounded foster life capabilities, including self-confidence, communication, and leadership. FIRST is known for its unique ethos, both embedded in the work students are tasked with and in the larger community culture.



FIRST® programs use strategies known to increase student interest and engagement in 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

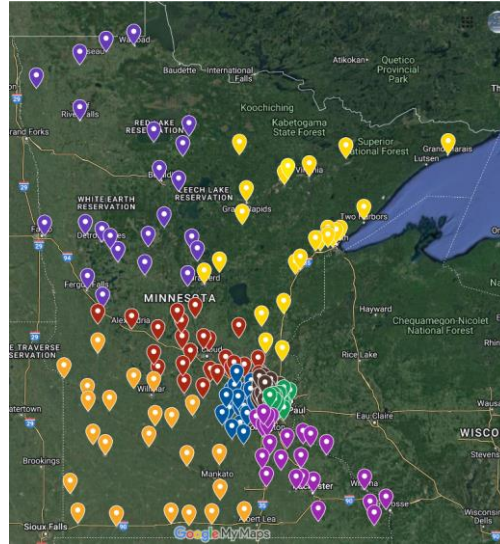
FIRST firstinspires.org/impact

Research from a multi-year longitudinal study shows FIRST® is advancing its mission to increase the number of students interested in STEM — and that interest is influencing their educational and career choices. FIRST alumni are 3 to 4 times more likely to take courses in computer science and 2.6 times more likely to take courses

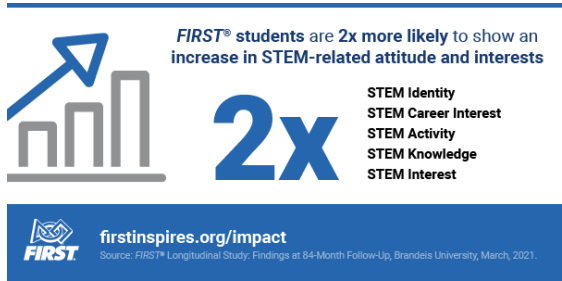
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in engineering. Our graduates are precisely the students that will help fill increasing workforce needs throughout MN.

The Minnesota FIRST Robotics Competition (MN-FRC) is an afterschool program involving high school students and adult mentors from almost 200 communities across the state. FRC began in Minnesota 2006, and has since helped prepare over 20,000 high school students for the workforce and STEM post-secondary studies. Under strict rules and limited time and resources, teams of high school students are challenged to build industrial-size robots to play a difficult field game in alliance with other teams, while also fundraising to meet their goals, designing a team “brand,” and advancing respect and appreciation for STEM within the local community.



Gracious Professionalism[®] is one core tenet of the ethos of FIRST. It's a way of doing things that encourages high-quality work, emphasizes the value of others, and respects individuals and the community. With *Gracious Professionalism*, fierce competition and mutual gain are not separate notions. Gracious professionals treat one another with respect and kindness in the process of learning,



working together, and competing. Knowledge, competition, and empathy are comfortably blended. In the long run, *Gracious Professionalism* is part of pursuing a meaningful life. One can add to society and enjoy the satisfaction of knowing one has acted with integrity and sensitivity.

Coopertition[®] is another core tenet that is displaying unqualified kindness and respect in the face of fierce competition. *Coopertition* is a philosophy that teams can and should help and cooperate even as they compete. This intense competition combined with Gracious Professionalism allows students to become empathetic citizens, team problem solvers, and effective collaborators.

The FIRST ethos in our programs is demonstrated by:

- Collaborative challenges
- An alliance structure—teams you compete against in one part of the day will be your allies in another part
- Awards celebrating and reenforcing the selfless helping of others, leadership, entrepreneurship, innovation, and teamwork;
- Lived Core Values.

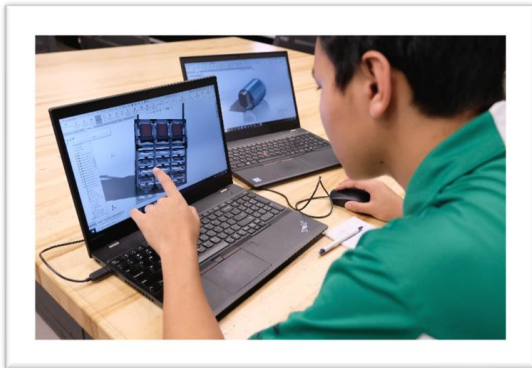


We express FIRST philosophies of *Gracious Professionalism* and *Coopertition* through our Core Values:

- Discovery: We explore new skills and ideas.
- Innovation: We use creativity and persistence to solve problems.
- Impact: We apply what we learn to improve our world.
- Inclusion: We respect each other and embrace our differences.
- Teamwork: We are stronger when we work together.
- Fun: We enjoy and celebrate what we do!



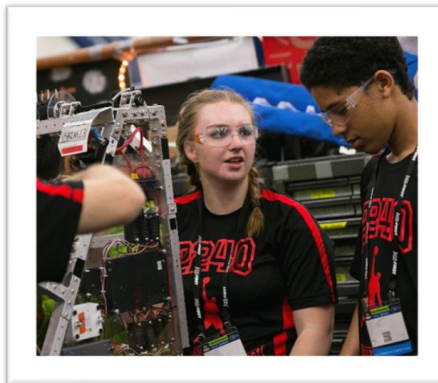
Hundreds of adult volunteer mentors from the education and business communities in Minnesota work side by side with *FIRST* participants to build their leadership and problem-solving skills and, more importantly, their sense of belonging and self-confidence. In addition, FIRST events at the local and state levels are made possible through a small army of volunteers who are passionate about the mission of FIRST.



Since 2007, approximately 20,000 Minnesota students have participated in this largely private sector funded program. In 2022, 26% of MN-FRC students identified as female, 19% of student were eligible for free/reduced lunch, and 23% were non-white. In 2023, an estimated \$3.5M will be contributed by the private sector to fund this impactful statewide

program. This does not include the many thousands of volunteer hours each year provided by adult mentors and event volunteers from Minnesota industry. The MN-FRC afterschool program is also recognized by the Minnesota State High School League.

In 2019, thanks to \$100K funding from the state, MN-FRC worked with DEED to purchase 5 gymnasium-sized robotics practice fields as part of our strategic plan to establish FIRST Community STEM centers serving both urban and rural communities. These robotics fields continue to provide support for MN-FRC teams in the Duluth, St. Cloud, Byron, St. Paul and Minneapolis areas.



Current Challenges

Minnesota FIRST Robotics Competition has seen significant changes in mentor and volunteer participation, as well as funding, as a result of the pandemic. The most significant challenges have been a result of changes in the workforce. Whether it is the increased demands on our education industry, or uncertainty of the business climate, MN-FRC is struggling now more than in the past to simply form a team.

Communities and students across Minnesota are interested in either returning to MN-FRC after COVID, or starting a new team. However, workforce challenges in education and industry have resulted in a significant decrease in adult mentors. Compared to the last full season before COVID in 2019, MN-FRC

saw a 24% decrease in mentors and volunteers during the height of the pandemic. During the 2022 season, numbers did improve, with only a 16% decrease from the all-time high in 2019.

In addition to the impact on our adult mentors and volunteers, our teams, who are largely funded through business and community support, saw a 50% decrease in funding during COVID. With this decrease in funding also came a significant increase in costs for our program. On average, costs



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have increased 30-35% since the last complete season before the pandemic (2019.) Since we have yet to have a MN-FRC season impacted by the pandemic, the final impact on our program is still uncertain. While MN-FRC works to establish new partnerships, funding has not yet recovered to pre-pandemic levels.

FIRST® Robotics Competition participants show significant gains in workforce skills such as teamwork, communication, and problem-solving



Accept input and feedback from others **99%**

Confidence in approaching problems in science and technology **81%**

Sense of team identity and belonging **84%**



firstinspires.org/impact

Source: 2020 FIRST Robotics Competition end-of-season youth survey

MN FIRST Robotics Competition is uniquely poised to significantly impact workforce shortages in STEM-related industries. However, the program's focus, currently, is still on recovery from pandemic impacts. With assistance in addressing these impacts, the focus of MN-FRC could again return to producing workforce ready high school graduates.



Proposal

Minnesota FIRST Robotics Competition is seeking funding of 3,000,000 to support a 2-year program focusing on the following aspects:

1. Support operational and programmatic costs of the MN-FRC STEM Centers in Duluth, St. Cloud, Byron, St. Paul and Minneapolis. (\$100,000/center/year = \$1,000,000)
2. Partner with DEED, CareerForce Centers, local Workforce Development Boards, and Minnesota State Centers of Excellence to create up to 200 STEM internships across the state in the summer of 2024. This unique pilot program would provide workforce training before placement, support services during placement, and follow-up to report outcomes for both businesses and interns. (\$2,000,000)

Total requested funding = \$3,000,000



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