

How to Encourage STEM to Students in Communities Where There Are No STEM Jobs



AT-A-GLANCE

Background

Central Missouri's Camdenton school district wanted to prepare its students, many of whom had never traveled out of their rural community, for jobs of the future. They wanted to introduce students to rapidly expanding STEM fields – even though there were few, if any, STEM jobs within a hundred miles. And they wanted to teach essential life skills that employers seek.

Finding and Building a Program

Camdenton R-III School District Superintendent Dr. Tim Hadfield embraced *FIRST*® because it encompassed elements that fit the district's comprehensive strategic plan, offering activities with relevant interest and giving kids a vision as to what they want to become. With the help of a lead team of educators and a \$10,000 start-up grant, *FIRST*® Robotics Competition Team 3284 was formed with 21 high school members. Today, Camdenton has fully adopted the *FIRST* Progression of Programs for K-12. One of every 14 students in the district is involved at some level.

Measuring Progress

Over 92 percent of graduating Team 3284 alumni have gone on to further their STEM education or a STEM career, and students at all levels are building "soft skills" such as teamwork and public speaking.

After-school program combines sports excitement and teamwork with rigors of science and technology

There's more than one way to measure educational success. Sometimes you don't need traditional data, such as graduation rates or number of students attending four-year universities.

Consider Missouri's Camdenton school district. Located next to the Lake of the Ozarks in central Missouri, Camdenton is a town of 3,800 but its school district educates 4,200 students drawn from surrounding communities that encompass 372 square miles. Camdenton school district wanted to help prepare its students, many of whom had never traveled out of the rural community, for jobs of the future. They wanted to teach life skills. They wanted to introduce students to STEM (science, technology, engineering, and mathematics) – even though there were few, if any, STEM jobs within a hundred miles.

Dr. Tim Hadfield, Camdenton R-III School District Superintendent, decided his district needed to give students STEM experience and teach them to be resilient, but couldn't wait for a lengthy evaluation before starting. Waiting for data to evaluate would mean not helping current students. By the time a pilot program could be implemented, evaluated, and rolled out, incoming ninth graders might graduate – without the essential skills to thrive in higher education or a chosen career.

"We wanted to give students life skills, which employers talk so much about," Tim said. "Employers say, 'I can teach them job skills, but I can't teach them life skills.' My advice to other superintendents is, don't wait. It's okay not to have all the I's dotted and T's crossed."

Eight years after moving forward, Tim knows he took the right approach by embracing *FIRST*® (For Inspiration and Recognition of Science and Technology). Camdenton has many talented and intelligent kids who simply didn't understand the breadth of available careers, let alone aspire to attain those careers.

Today, Camdenton has fully adopted the *FIRST* Progression of Programs for K-12 in its district. One out of every 14 students in the district is involved at some level – and the district would love to continue to grow the program. The extraordinary growth is testimony to what the program means to students, the school, and the community. In fact, the elementary teams are formed using a lottery system, because demand surpasses the school's resources of space, staffing, and financing.

“STEM fields are rapidly expanding, and the district determined that its students should not be left behind. Students need to understand that their future does not have to look like their present. You need to learn by doing.”

— DR. TIM HADFIELD, CAMDENTON R-III SCHOOL DISTRICT SUPERINTENDENT

Finding a program

“My background is working with at-risk youth,” said Sherry Comer, Camdenton’s Director of Afterschool Services. “I wanted to expand opportunities for our kids. I don’t want kids to be afraid to jump in and get their hands dirty.”

She was receptive several years ago when her husband Mitch, a Camdenton teacher, suggested *FIRST*, a non-profit organization that inspires young people’s participation and interest in science and technology. Mitch had been exploring programs for two years, looking for something to excite a few very bright students. His focus was to prepare students for emerging jobs, which require new skills.

“He felt kids needed to be prepared for jobs that don’t exist yet,” Sherry said.

Intrigued by *FIRST*, Mitch suggested Sherry attend a competition.

“I went to a regional event expecting to stay an hour, but I spent all day,” she said. “I was hooked seeing the *Gracious Professionalism*,[®] and seeing interaction between kids. I could see kids who struggled with social awkwardness being pulled out of their shells. *FIRST* teaches the soft skills to kids, which are critical to future success.”

Everyone involved in the program mentions *Gracious Professionalism*, part of the ethos of *FIRST* to compete fiercely, but treat all participants with respect and kindness.

“Attending the regional competition was key,” Tim said, “because until you see a competition, I don’t think you get it. It takes time for people to see and understand what *FIRST* is. *FIRST* offered a lot of elements that fit our comprehensive strategic plan.”

STEM fields are rapidly expanding, and the district determined that its students should not be left behind. Students need to understand that their future does not have to look like their present, Tim said. “You need to learn by doing,” he added.

That was as true for Camdenton in deploying *FIRST* as it was for the 21 students who participated on the initial *FIRST* team.



Mitch and Sherry Comer (far left), along with members of Camdenton’s *FIRST* teams, accept a grant from a local community organization.



Camdenton *FIRST*[®] LEGO[®] League team members put their robot to the test in competition. One of every 14 students in the Camdenton school district is involved in *FIRST* at some level.

Getting started

There are very few STEM professionals in Camdenton, and no industry; Walmart is the largest employer. With the number of students and the size of the district, there are more students on campus weekdays than in the town.

Thanks to some guidance from Susie Mathieu, who heads up *FIRST* in Missouri, and local 4-H-representatives, Sherry applied for and received a \$10,000 *FIRST* start-up grant from JCPenney Afterschool in 2010.

With JCPenney approved funding, Mitch agreed to be the Head Coach of the *FIRST* Robotics Competition team, with 21 high school members and three adult Mentors.

"FIRST offers activities with relevant interest. It gives our kids a vision as to what they want to become later in life."

— DR. TIM HADFIELD, CAMDENTON R-III SCHOOL DISTRICT SUPERINTENDENT

"As a technology teacher I like to give our students the why," he explained. "The core classes do a great job, but oftentimes students aren't satisfied and wonder why they need to know the geometry."

The priority was to create a committed lead team of educators, then shape the program to meet district and community goals.

Sherry looked for ways to "pull out the introverted kids." She said a wide range of research shows that regular participation in high-quality afterschool and summer learning programs is linked to significant gains in academics, school attendance, and work habits, as well as reductions in behavior problems among disadvantaged students.

The Comers point out that while it's important to introduce STEM education, the district wanted to see students build so-called soft skills, such as meeting new people and presenting with confidence.

Mitch cited the *FIRST* core values of *Gracious Professionalism* and *Coopertition*® that encourage high-quality work, emphasize the value of others, and respect individuals and the community.

"Our community and our leaders know that our community is only as good as our education system," Sherry said. "They are bound and determined that these kids will have same advantages as kids in bigger cities."

Building the program

From an initial team of 21 students in one program, Camden's *FIRST* program now fields more than 250 students across 12 *FIRST*® LEGO® League Jr. teams, 14 *FIRST*® LEGO® League teams, five *FIRST*® Tech Challenge teams, and one *FIRST*® Robotics Competition team.

Sherry said it's essential to consistently look for ways to promote the program.

"I think we did it right by going out to the community. The kids are visible at many organizations" – Optimists Club, Lions Club, Chamber of Commerce, and the Society of Engineers, for example, she said. *FIRST* team members have given over 175 presentations at a local, state, and national level to grow *FIRST*, and worked hard to gain sponsors.

"I try very hard with parents, because getting them involved is key," Sherry said.

She realized that if parents did not have a good school experience, they project that onto their children.

"I can read parents' body language as they get close to the school," she said. "Our goal is to get them comfortable in school, even if they had a bad experience as a student themselves."

She recruits parents to contribute in any way she can find: "I've asked people to bake cakes, then encouraged them to stay to serve it. Then they start talking to the kids and before long they become official Mentors, technical or otherwise."

"*FIRST* offers activities with relevant interest," Tim said. "It gives our kids a vision as to what they want to become later in life."



A Camden *FIRST* team Mentor and student work together to build a robot.

"I got into mentoring to spend time with my oldest son. I'm very much an outdoorsman. He is not. Mentoring gave me an opportunity to bond with my son. It was an incredible opportunity."

— DENNIS HARMON, FATHER OF TWO TEAM MEMBERS AND A MENTOR IN ELECTRONICS

Measuring progress

Consistent with Tim's approach, the district did not focus on formal measurements, such as the number of students going to four-year colleges. The Camdenton team focused on introducing broader career opportunities, and fostering skills in teamwork and public speaking.

Andrea Weiss, a kindergarten teacher who coaches second and third graders in *FIRST*, sees a difference even with her very young students. "I see a lot of confidence building. I even see it in the hallways. I think team members are more apt to take on leadership roles in schools."

Often kids don't know how to fail, but they need to learn from it, Sherry added. "By far, that's the biggest skill you can teach a child. You can fail a lot at robotics. Those soft skills give you an advantage in your job. If you don't have them, you're sunk. Sitting behind a computer screen will not always work."

She related the story of one student in Mitch's graphics class, who was hesitant to participate, but who eventually became a team member at Mitch's insistence. This student's father, a welder, did not have a good high school experience, so he was reluctant to visit the school, much less get involved. Eventually, they were able to persuade the father that his skills were of value to *FIRST* team members, and he became a Mentor. "Those are the things that I look for," she said.

She shared another story of a student who couldn't walk down the halls of the high school and make eye contact with other students or a teacher in the hallway. By the end of the season, the student had developed the skills to represent the team in interviews and speak at conferences. Four years later, she gave the graduation speech at the School of Engineering at the University of Missouri.

"The kids I work with in high school are hungry," said Dennis Harmon, father of two team members and a Mentor in electronics. "They really want to learn. Get them together and they feed off each other, and they learn more. If I don't know the answer, they go off and get it. The camaraderie is very strong. *FIRST* puts together kids who are not popular, or who might not hang out together. They become popular. It improves their self-esteem. They build skills they might not ever have otherwise."

"There is a wide array of students on the team," Tim said. "Many times we have very bright kids who don't have teamwork skills because they do so well on their own. And some kids who are not doing as well academically reach untapped potential on a team."

What's also impressive, according to Sherry, is that over 92 percent of graduating Team 3284 alumni have gone on to further their STEM education or a STEM career.

And there are the unexpected benefits. "I got into mentoring to spend time with my oldest son," Dennis said. "I'm very much an outdoorsman. He is not. Mentoring gave me an opportunity to bond with my son. It was an incredible opportunity."