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CHEVRON & PLTW:

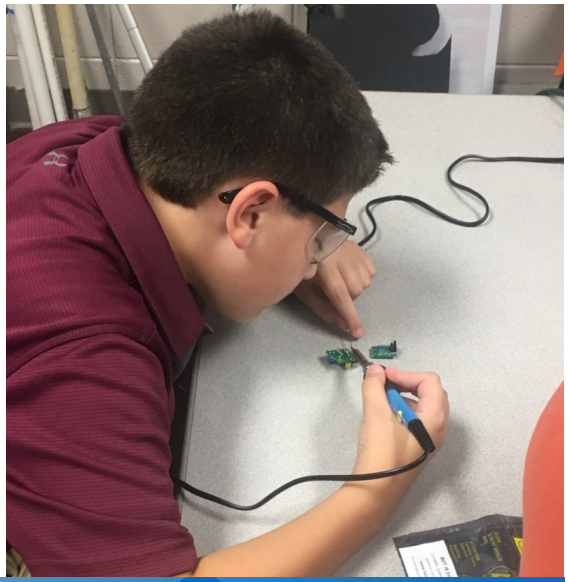
Partnering to build a STEM community in the Gulf Coast

On August 29, 2021, Hurricane Ida churned through Terrebonne Parish, Louisiana. With winds up to 150 mph and a 3-to-6-foot storm surge, the Category 4 storm damaged every school in the Terrebonne Parish School District (Beven, Hagen, & Berg, 2022; Juhasz, 2021). Among the losses were some of the district's Project Lead The Way (PLTW) equipment. To get PLTW classes back on track, Nathan Cotten, the district's STEM (science, technology, engineering, and math) Curriculum Specialist, tapped into unspent PLTW grant funds provided by Chevron. "If we wouldn't have had Chevron, we definitely wouldn't have been able to pick up where we left off from last year," says Cotten, "...But I got all of the PLTW equipment to make sure they could offer those courses; to get them back where they started."

Cotten credits the district's partnership with Chevron for helping get PLTW classes back on track and for building their PLTW program in the first place: "[PLTW] was strictly because of Chevron's support," says Cotten. Terrebonne Parish's experience is not unique in the Gulf Coast. Chevron has helped schools in the region respond to disruptions like Hurricane Ida and COVID-19 by providing everything from fuel to remote learning technology. Chevron has built a strong STEM community in the Gulf Coast by investing in PLTW programs in Louisiana and Mississippi and committing to STEM initiatives throughout the region. This STEM community is developing young people who have the technical skills and problem-solving capacity needed to sustain the Gulf Coast's STEM workforce and its economy.

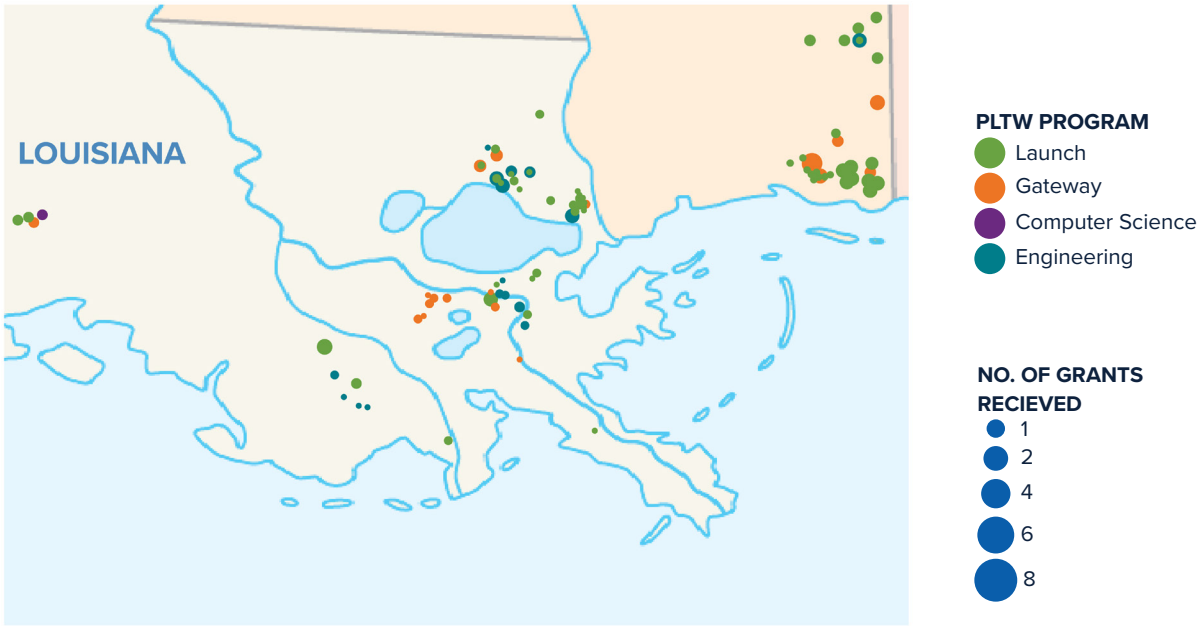
> *Chevron is there to help us with whatever we need."*

- Derek Read, CTE Director and Dean of Workforce Education, Pascagoula-Gautier School District



PLTW plays a key role in this community by building students' interest and skills in STEM from elementary through high school, by partnering with Chevron on community initiatives and by acting as a source of expertise in STEM education for Chevron and its partners. "Overall, I think that the partnership with the school districts and PLTW, and Chevron has been a positive one," says Amy Brandenstein, Community Affairs Representative for Chevron-Pascagoula. "It is a good feeling to know that we have students that originally probably would've never even considered engineering...or computer science. And then, that ended up being their passion and now they're exceling in it, and it will be their long-term career. I think, in essence, that's what it's all about."

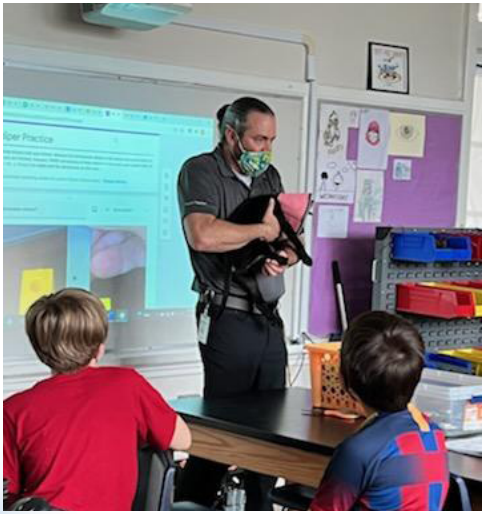
Schools Receiving a Chevron PLTW Grant Between 2017 and 2022



Building a STEM community early

Students' interest in STEM begins early and can be fostered in many ways: through in-school and out-of-school experiences -- including camps and competitions -- by exposure to excellent STEM teaching, and through encouragement from family and the community (Maltese & Tai, 2010; McClure et al., 2017). Chevron's STEM investments follow this multipronged approach maximizing the potential to spark and maintain students' interest in STEM.

For example, one school district that borders Chevron's refinery in Pascagoula, Mississippi leverages Chevron funding to support a summer robotics camp for students, a fifth grade STEM day, and PLTW in the classroom including supplies, materials, and teacher training. "Anytime I can enhance the instructional day, time, [and] experience of children, I'm always going to say 'yes,'" explained the district's superintendent. "Especially where there has been a lack of exposure. We don't have science camps here on the Coast." Chevron also partnered with Moss Point School District in Mississippi to retrofit a closed school into an education center for preschool and early elementary students. The renovated school is open to the community on family nights and brings in students from area preschools and day care centers. "Through play, some of our kids are learning some of those important basic science skills just through experimentation within those rooms and walls that we've built," explains Katrina Reno, Assistant Principal for Escatawpa



Chevron wants their workforce to be great moving forward; wants the smartest, the best folks to hire. And the only way to start that is to start them young. Get them interested in math and science. Let them know that thinking outside the box is what we're looking for."

- Barbara Brown, Project Manager, Chevron-Pascagoula

Upper Elementary School.

Among PLTW Launch teachers in Chevron-supported schools, 86 percent agreed that their students had a better understanding of how science applies to real-world scenarios because of PLTW, and 71 percent reported that their students learned about career paths and opportunities in PLTW. One superintendent reported that students' attitudes toward STEM changed because of this increased exposure. "We have several students who have expressed interest in doing coding at the middle school level," she says, "Once we start getting those requests, we know that the impact has been made because the exposure is coming from the lower grades; it's coming from PLTW." Instead of wanting to be a football or basketball player, she notes, students now want to go into science and technology

> *The community's opinion of the school has increased. They're liking what they're seeing. They're enjoying that the school is becoming more hands on and more engaging. They're seeing things like the high school where they're competing in TSA [Technology Student Association] and e-sports and seeing that we're doing these things outside of our building."*
>
> – Katrina Reno, Assistant Principal, Escatawpa Upper Elementary School

careers. One middle school PLTW student, who took both PLTW Launch in elementary school and PLTW Gateway in middle school, illustrated this shift in thinking: “After seeing how well I have done in STEM and how fun it is in general,” the student commented, “it’s kind of pushed me toward that way a little bit more than the other career paths.”

According to Reno, the district’s initiatives aren’t just building interest in STEM among students. Parents are also interested because their kids are talking about PLTW and STEM at home. “The last year that I did the fifth grade STEM Day, I actually had parents asking if they could come and either be support or just come see it because they were curious about it,” says Reno. “So it’s bringing up conversations and building positivity about what we have going on in our building.”

St. Tammany Parish Public Schools in Louisiana is also utilizing its partnership with Chevron to expose students to STEM early. “We’re growing them and creating the interest early on,” says Jackie Jenkins, St. Tammany’s Supervisor of Curriculum and Instruction. In addition to offering PLTW in a dozen schools, St. Tammany partnered with Chevron to create a grant program that will allow elementary schools to establish a STEM club in partnership with their high school. “Some of our high school kids will start mentoring our elementary students,” explains Jenkins. “Those high school students are then

PLTW Launch teachers report that students learn about careers and how science applies to real life.

86%

"My students have a better understanding of how science applies to real world scenarios because of their experiences in PLTW."

71%

"My students learned about career paths and opportunities in PLTW."

turning around and helping to build the interest and the love for STEM in our elementaries."

Building a skilled STEM community

At the middle and high school levels, Chevron supports PLTW Gateway programs, PLTW Engineering pathways, and PLTW Computer Science pathways. "Chevron is proud to support Project Lead The Way and their mission to empower students to thrive in an ever-evolving world," said Leah Brown, Public Affairs Manager for Chevron's Gulf of Mexico Business Unit. "The Project Lead The Way curriculum enables teachers to engage students in real-world learning. Their hands-on educational experiences also foster a passion for STEM and provide students with the skills they need to help ensure their future success."

The school and district leaders we spoke with universally credited Chevron with bringing PLTW to their schools. "PLTW came to the Coast through a grant from Chevron for St. Martin High School," explains John Mundy, PLTW Director in Mississippi's Jackson County School District, which was the first in the Gulf Coast to implement PLTW. "When we saw what the possibility was and what the program offered...we went ahead and stepped in and jumped into the deep end of the pool." As PLTW engineering teacher Tammy Sampson noted, "Without [Chevron] support, the program would not be available to our students...For my students, it's just been a game changer for them. They are as equal or

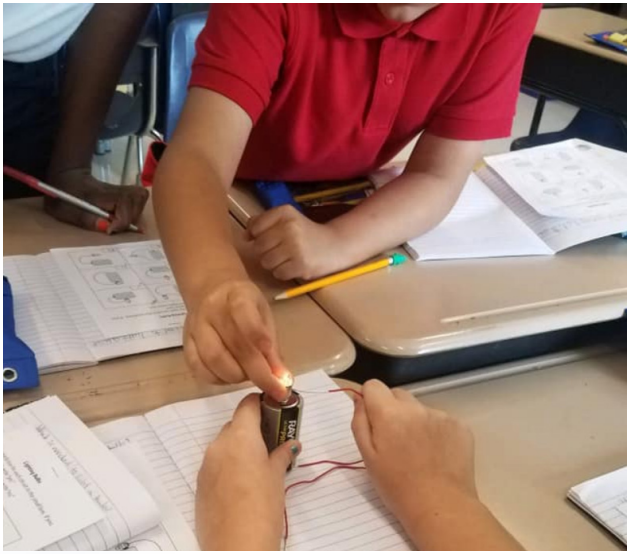
> *"It's always okay to go back and do things the right way, but it's never okay to just give up."*
>
> – PLTW student, St. Martin High School, Jackson County School District

In-school initiatives:

- Funding for PLTW programs
- FABLAB's in-school services
- Employees mentor & support students
- Partnership with DonorsChoose.org to provide life essentials and classroom supplies

very competitive to the other students that have been exposed at science and math academies. So, they can compete with those students because of this program." Adrianna Adams, PLTW engineering teacher in Terrebonne Parish also commented on the opportunities Chevron's support of PLTW has provided to students: "So we started with Intro to Engineering, then we went to Principles of Engineering because [district administrators] realized how awesome it was to get the kids to think in terms of STEM, in terms of engineering...The district sees that it's giving these kids these opportunities we wouldn't necessarily normally have."

Students we spoke with echoed these sentiments by highlighting the unique opportunity PLTW courses provided and the skills PLTW helped them develop. Current and former PLTW students noted the technical skills they developed in class, including learning software like AutoCAD and how to operate machines like laser printers, and the transportable skills they built, including problem solving, design thinking, working in teams, and communicating with others. As one of Sampson's students commented, "In this class, you learn to work with groups and work with other people and becoming a leader and distributing work." Another student described how they approach problem solving: "When something doesn't work, then we all brainstorm. We start basically all over and implement the things that did work and then focus on the parts that are stumping us."



"I feel like I've always been intrigued by math and science, but being in PLTW, it's kinda cool to see how everything is connected and how everything comes back around."

– PLTW student, East Central Middle School, Jackson County School District

In surveys of Chevron-supported schools, 80 percent or more of PLTW Gateway and high school students reported that they were better with technology after taking PLTW, and over 90 percent of PLTW Gateway and high school teachers reported that their students were better problem solvers because of PLTW.

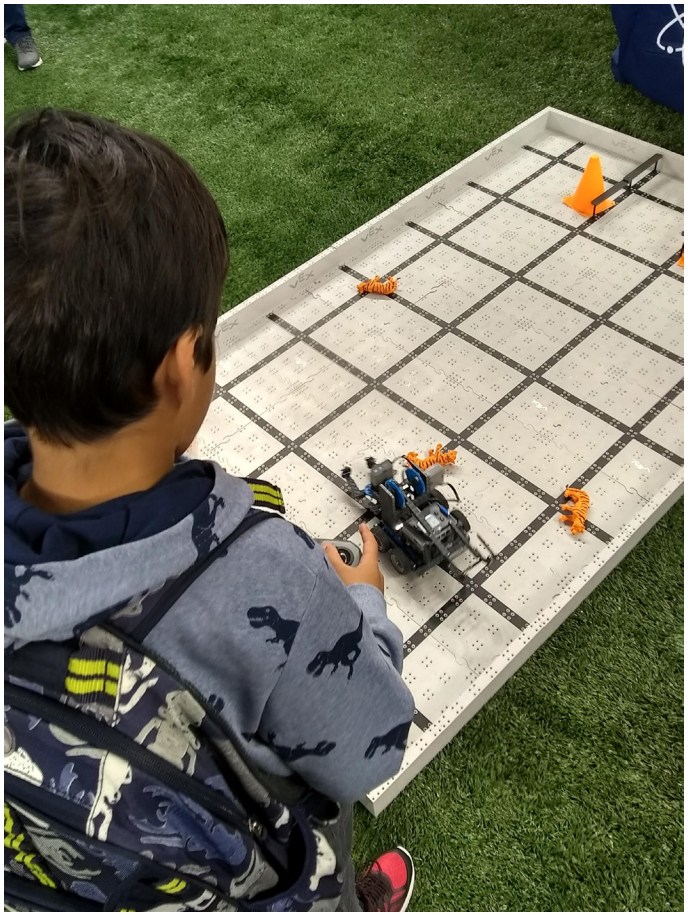
PLTW teachers and students report improvements in technology and problem solving skills

"My students are better problem solvers because of their PLTW experiences."

– PLTW Teachers

"After taking PLTW, I am better with technology"

– PLTW Students



The PLTW courses that Chevron supports often feed into middle and high school robotics teams, many of which are also supported by Chevron. Studies have found that out-of-school STEM programs, like robotics teams and STEM clubs, have a positive impact on students' interest in STEM, enhance in-school learning, and build transportable skills (Allen et al., 2019; National Research Council, 2015; Young, et al., 2017). Derek Read, the CTE Director and Dean of Workforce in Pascagoula-Gautier School District, reflected that he was "blown away" seeing students work together at robotics competitions and tied that back to PLTW: "To me, the biggest thing that PLTW does…[is] teaching them, at those times, how to bring all their individualities together and work together for a bigger thing." Jackie Jenkins also commented that PLTW teaches students in St. Tammany Parish skills like "problem solving and learning how to think" and to "work collaboratively as a team," which students apply during their robotics team competitions. PLTW students from the high school robotics team are sharing these STEM skills with the community. As Jenkins describes, "They also go out, just to different places. To libraries, bookstores on the weekend and they take their robots and even some of the other materials and do experiments with kids who just walk up…just showing that in the community."

Building an inclusive STEM community

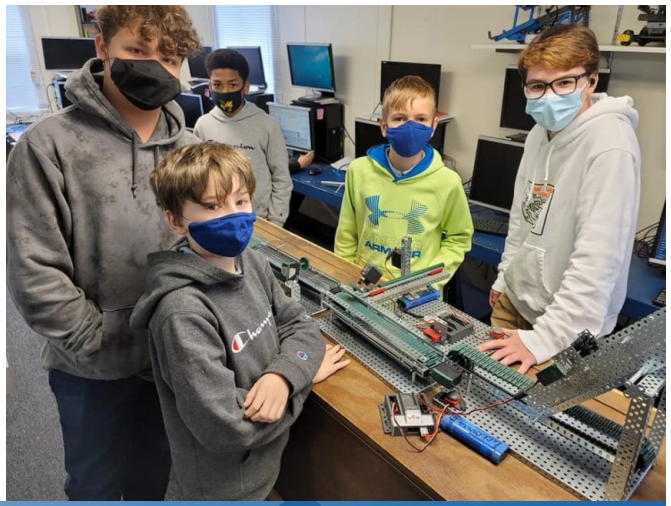
Chevron is not only creating a skilled STEM community; it is also creating an inclusive STEM community by expanding access to STEM learning through PLTW and other STEM initiatives. “The exposure piece is pretty key,” says Brandenstein of Chevron-Pascagoula’s initiatives, “But the diversity and inclusion piece is also a strong component of [PLTW] because it’s open to everyone and anyone can do it.” This work is critical: A recent analysis of federal employment data found that Black and Hispanic workers are underrepresented in the STEM workforce, and female workers are underrepresented in computing and engineering careers (Fry, Kennedy, & Funk, 2021). Moreover, the analysis found that Black and Hispanic students and women are underrepresented among STEM degree earners, indicating that this disparity may continue without changes in the STEM pipeline.

Chevron’s support for expanding access to PLTW has allowed more schools in the Gulf Coast to bring STEM to their students. The number of PLTW programs in Louisiana and Mississippi grew from 218 in 2017-18 to 364 in 2022-23, many of which were started or expanded through the PLTW grants that Chevron supported.

Nathan Cotten noted that PLTW allowed Terrebonne Parish to expand its science options for students despite a shortage of science teachers: “Certified physics teachers are hard to come by, especially in rural areas...So, I was looking for a program that trained a teacher and had a curriculum that at least would give the teacher a platform to work from. And that to me is one of PLTW’s biggest assets because teachers aren’t starting from scratch.” More than 400 teachers have been trained through Chevron’s PLTW grants, and Chevron continues to support teachers through grants for classroom materials, like computers, technology upgrades, and 3D printers. Chevron even held a regional conference to connect PLTW teachers in Louisiana and Mississippi and help them build a local network to support their work.

For Ronny Seal, Curriculum Specialist for School-to-Career in Louisiana’s St. Charles Parish Public Schools, PLTW provided a way to make STEM accessible to more students. St. Charles Parish received a Chevron grant in 2020 to expand PLTW from its high schools into its middle schools, where, according to Seal, 500 students participated in PLTW’s Computer Science for Innovators and Makers unit last year.

> *We want more students to have access to [STEM] programs. If we can only do them after school...then that’s not acceptable. It needs to be accessible for more [students].”*
>
> - Ronny Seal, Curriculum Specialist for School-to-Career, St. Charles Parish Public Schools



"We have a lot of confidence in PLTW's curriculum, in their development, in their program, in their support of teachers and implementation," explains Seal, "and so I have all the confidence in the world, those 500 students, we would not have been able to offer that if it was afterschool just through a robotics club." Next, Seal hopes to find time in their elementary school schedule to introduce PLTW Launch and get students started even earlier.

For schools that don't have PLTW courses or want to supplement those courses, Chevron supports the Jackson County FABLAB. FABLAB Jackson County visits schools in the region to engage students in project-based learning and STEM, and to support teachers with lesson planning and training. Through both its mobile and stationary labs, the FABLAB allows students to work with tools, machinery, and technology used in STEM industries, and experience the engineering design process using hands-on activities and real-world problems. Scott Beebe, a retired PLTW teacher, describes it as "a makerspace that incorporates everything PLTW stands for." With Chevron funding and support from other area employers, FABLAB offers its services for free in low-income communities and runs STEM summer camps for students who don't typically have access to those opportunities. Beebe emphasized the value of bringing STEM learning to students in their

Chevron PLTW Grants (2017-2022)

238 Chevron supported PLTW grants

117 schools and districts recieving PLTW grants

More than:

76,000 Prek -- 12 students engaged

485 teachers trained

360 PLTW programs supported

schools and communities, as FABLAB Jackson County does: “You can tell some of these kids, ‘Well, it’s only a 15-mile trip and it only costs a $100’. Well, it might as well be the moon and a million dollars because they don’t have any way to go 15 miles and they don’t have any way to pay $100,” Beebe explains, “So you have to get that into their classroom and into their communities, and Chevron has been a huge part of doing that.”

Building an interconnected STEM community

Chevron’s employees also play a key role in diversifying the STEM pipeline by volunteering their time and expertise to build connections with students. These connections matter. Providing students with role models in STEM fields can motivate students to pursue STEM. Role models from groups that are underrepresented in STEM fields and those with a background similar to students’ backgrounds can be especially motivating (Gladstone and Cimpian, 2021).

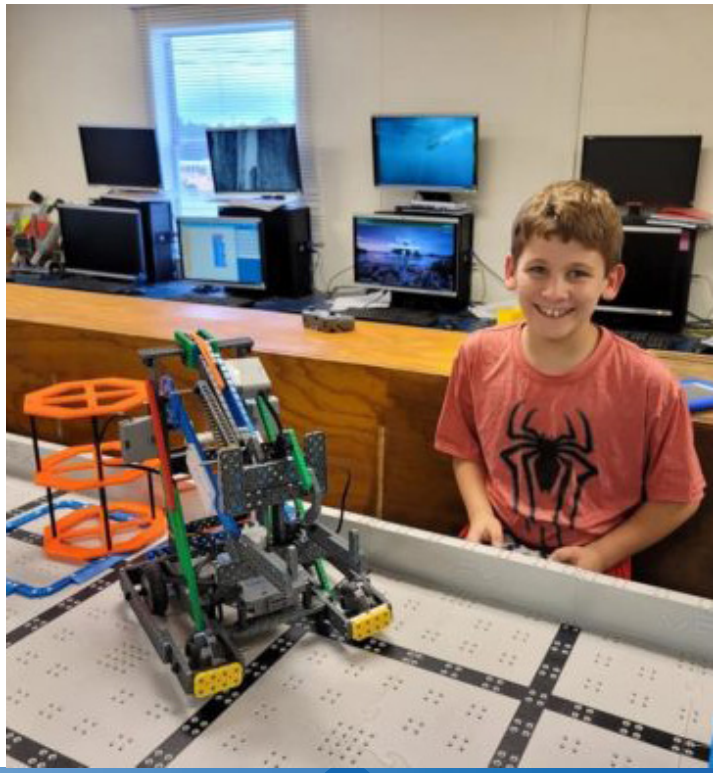
Chevron’s mentoring program in Jackson County, for example, connects students with a STEM professional who has a similar educational background by bringing Chevron employees who graduated from an area high school back to their alma mater to talk with current students. It was through this program that Susan Garwood, then a PLTW student at St. Martin High School, met Barbara Brown, a project manager at Chevron and graduate of the high school. “She came and talked to us about working at Chevron…and how having the

Out-of-school initiatives:

- FABLAB summer STEAM camps
- Robotics teams & STEM clubs
- Family STEM nights & STEM days

experiences she had in high school prepared her for that," recalls Garwood.

Now Garwood, who is currently studying electrical engineering at Mississippi State University, is a role model herself, coming back to the high school to talk with students about her experience. Even while in high school, Garwood helped implement STEM nights for elementary and middle school students and trained teachers to use PLTW equipment. "I didn't realize I enjoyed robotics as much as I did until high school because I didn't have that opportunity until high school. And so, the fact that we were able to expand into the lower grade systems was great, and especially being a woman. Because when I took my first class, I was one of two girls, and so just being that female presence for these younger kids, these younger girls, was an amazing opportunity."



Many other students have also connected with Chevron employees. One PLTW student from East Central High School remembered employees from Chevron speaking to their class: "And they really touched on what their specific job was at where they worked...and talked to us about how we learn that in this class. And they showed you how...little things like problem solving, when they are in the field or you're in the field, that you use those little things more than you would think." PLTW teachers mentioned Chevron employees coming in as guest speakers, to judge student projects, and to host mock interviews.

Tammy Sampson, for example, recalls being assigned Chevron employees when they first started PLTW: "If I was having a big project, they would come in and judge those projects...Any competition we have, I'll call them in to judge those projects, and be the mock interviews." At Resurrection Catholic School in Pascagoula, Mississippi, PLTW teacher Eric Denmark remembers taking his 7th and 8th grade PLTW students to workshops where students could do hands-on experiments with Chevron employees before COVID restricted in-person interactions. "When my kids see that and they see a real person doing the same thing they're doing," says Denmark, "it fires them up wanting to learn more about it. So that's what's so cool about Chevron."

"One of my favorite things about this program is talking with the kids because growing up...I didn't really know what was out there. My dad worked construction with the military. My mom was [in] nursing. But beyond that, I didn't know what else there was. I think talking to these kids and letting them know what else is out there early on really opens up their mind to what they can do."

- Barbara Brown, project manager, Chevron-Pascagoula

Building a STEM community in the community

Students engage in, and learn more, when STEM learning happens in multiple venues throughout their community (National Research Council, 2015; Levay, Volmert, & Kendall-Taylor, 2018). Scott Beebe, who helped start PLTW in the Jackson County School District, credits Chevron's funding of PLTW and other STEM initiatives for growing STEM interest and programming throughout the Gulf Coast. "When I started in St. Martin in 2012, there was nothing. And across the coast, I couldn't tell you a single time I heard anything about a STEM anything," Beebe recalled. Beebe then described "watching PLTW grow in our community" with more and more schools and community centers, like the Boys and Girls Club, YMCA, and FABLAB, engaging in PLTW and other STEM learning initiatives. "And every one of these things," Beebe emphasized, "is directly tied to Chevron in some shape or form."

One avenue Chevron uses to bring STEM to the community is their partnership with the New Orleans Saints football team. Chevron's work with the New Orleans Saints includes the "Coach of the Classroom" video series, which helps fans understand the science behind football. In the series, local teachers – many of whom are PLTW teachers – break down the science behind football. For example, in the 'Science of the Juke Move', Matt

> *"A teacher just talking about it might strike an interest, but when [Chevron employees] actually take the time out and come here in person and put on talks about how they got to where they're at to become an engineer, it blows the kids minds."*
>
> - Eric Denmark, PLTW teacher, Resurrection Catholic School

Owen, PLTW teacher at Lusher Charter School, explains how applied force and friction combine to allow running backs to avoid defenders. PLTW staff have advised on the Coach of the Classroom series, providing both content and recommendations for teachers to be the "Coach" in the videos. PLTW also typically participates in STEM fest, an event hosted by the New Orleans Pelicans and Saints and Chevron. After two years of disruptions due to COVID, the 2022 event was a success, with over 1,500 students from the region engaging in hands-on learning and interactive STEM demonstrations.

STEM fest isn't the only community celebration of STEM that Chevron supports. Chevron also sponsors the French Quarter Festival, which features a Chevron STEM Carnival that engaged over 1,500 kids in 2022. And Chevron engages high school PLTW students in the annual Chevron Design Challenge – set to resume in 2023 – during which students present their engineering design solutions to a panel of judges. Before COVID, Chevron also hosted a career fair for middle school students in Moss Point to get them excited about careers in engineering. And Derek Read noted that Chevron is a partner in Pascagoula-Gautier's "You're Hired" event for juniors. During the event, students participate in sessions on topics like social media, dressing for success, and resume writing. These community STEM events provide another opportunity for Chevron to build awareness of and access to STEM learning opportunities among Gulf Coast students and their parents.

> *The kids in these communities, even though some of the things aren't being directly funded by Chevron, are being impacted because the schools are being exposed to the Chevron funds. Exposed to what Chevron has done in other schools, and they're saying 'yeah, we want to do that too.'"*
>
> - Scott Beebe, retired PLTW teacher

Building a STEM community for the future

As Scott Beebe tells it, his son, Scott Beebe Jr., did not want to take his father's PLTW Gateway Automation and Robotics class – he wanted to take P.E. instead. But, after taking the class, Scott Beebe Jr. ended up falling in love with robotics, joining the school's robotics team, and coming in second in the state robotics competition. Scott Beebe Jr. is now an electrical engineering student at Mississippi State University and runs a business supported by Chevron in which he shows teachers and their students how to use the same equipment he used in his middle and high school PLTW classes—Autodesk, Tinkertab, and Scratch. "It changed his career path. It changed his whole world," says Scott Beebe.

Scott Beebe Jr. attributes this change to taking that first PLTW class, which led to his involvement in a variety of PLTW-related and Chevron-supported STEM opportunities: "I think PLTW started the chain of me doing every STEM-based class or job that I've ever done. So I started PLTW in middle school and that led to every engineering or career-technical course I took in high school. And that led to me doing the FABLAB and teaching four years of summer camps that were STEM based. And it led to me working at that boys and girls club my senior year. It led to me starting this business. It led to me doing electrical engineering. So, I think it really opened up

> *Anything that was impacted by me, I believe was impacted by Chevron and was impacted by PLTW. Because I became a different person and teacher."*
>
> - Scott Beebe, retired PLTW teacher

Community initiatives:

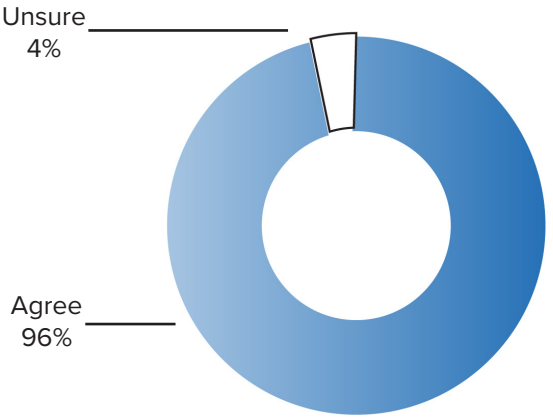
- New Orleans Saints' Coach of the Classroom
- New Orleans Saints' & Pelicans' STEM fest
- French Quarter Fest
- Chevron Design Challenge

what I wanted to do as a career and at a very early age, I think, because I didn't know what I wanted to do until I started taking the PLTW courses."

This is exactly the chain of events that Chevron hopes to start with its investments in PLTW and other STEM initiatives in the Gulf Coast, with the goal of building a strong STEM workforce for itself and other industries in the area. "Not only for us, but for many companies across the Coast, having a really strong STEM pipeline of students is really essential for the jobs of tomorrow," says Amy Brandenstein of Chevron-Pascagoula. This investment will also benefit students. The Bureau of Labor Statistics projects an increase of over 1 million STEM jobs in the next decade. And PLTW students will be well-prepared to fill these positions: 96 percent of high school teachers at Chevron-supported schools agree that students' PLTW experience makes them more likely to succeed in STEM careers.

The value of a homegrown STEM workforce is not lost on the many students, teachers, and community members touched by Chevron's STEM investments. "[Industries along the Gulf Coast] want to keep kids home grown and have them come back and live here and work here," explains Jackson County PLTW director John Mundy, "And that's one of the drives behind

My students are more likely to be successful in pursuing STEM related degrees or careers because of their PLTW experiences



Chevron. With us being in the footprint of Chevron's industry...they're wanting people to live here. They want to send them off, train them, and bring them back, and let them invest in the community."

Chevron thanks Project Lead The Way for their longstanding partnership. We also thank the PLTW staff, teachers and students for their efforts and excellence – and for the inspiration they give us each day."

- Leah Brown, Public Affairs Manager,
Chevron Gulf of Mexico Business Unit

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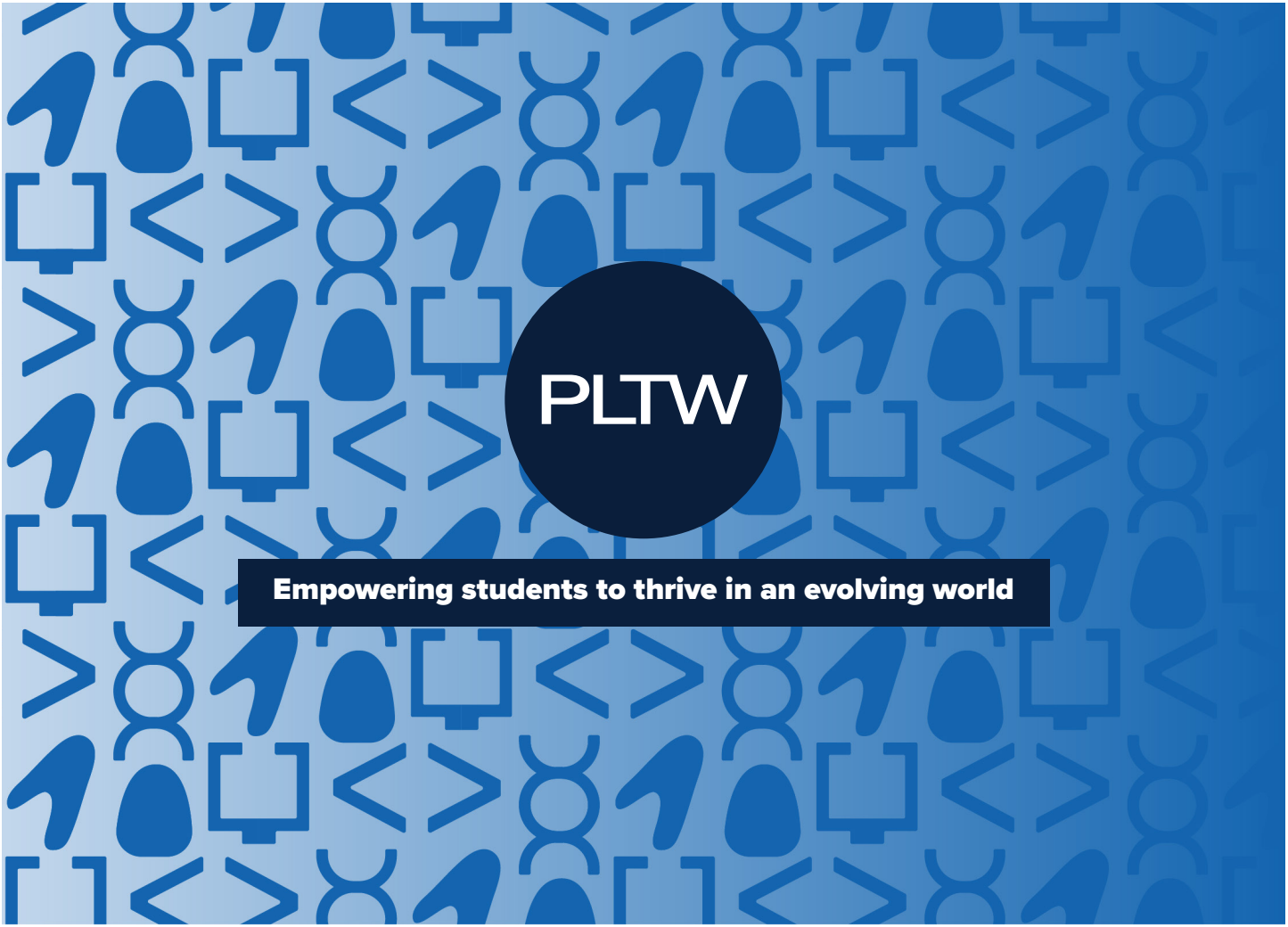

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