The Tennessee STEM Innovation Network is proud to work alongside the Tennessee Department of Education to provide K-12 STEM education outreach across the state. The Network, managed by Battelle, offers a wide range of STEM wrap-around services and engagement opportunities for students, teachers, and districts.

One of my favorite parts of our role is managing the Tennessee Rural STEM Collaborative (TRSC) program. As a child of rural Arkansas, I’ve experienced first-hand the challenges rural students, teachers, and districts face. Each year, this program serves dozens of underserved rural counties.

Our program design focuses on Place-Based Education as a catalyst to help revitalize rural communities by engaging students and teachers in solving community problems through a STEM lens. The projects that teachers design and implement impact local communities by increasing student and teacher engagement and boosting academic outcomes. Teachers explore and integrate innovative instructional approaches that support student agency, boost access and opportunity, prioritize deeper learning and personalize learning experiences.

We are honored to work alongside the Tennessee Department of Education to connect STEM education and build the capacity of rural educators and students across the state. I hope you’ll read on and meet the amazing teachers and communities at the center of it all.

Sincerely,

Brandi Stroecker
Director, Tennessee STEM Innovation Network - Battelle

Participating Counties 2020-2021

PROGRAM OVERVIEW

The Tennessee Rural STEM Collaborative (TRSC) is a year-long cohort of educators from across Tennessee that works towards ensuring that all students have access to high-quality learning opportunities in STEM by exposing them to 21st Century Skills and local STEM career pathways.

This program is designed to:

- Deepen knowledge in STEM educational issues and exercise educator voice and perspective to bring positive change within their communities
- Identify assets within rural communities that can support high quality STEM education and work-based learning
- Expand rural educator’s sphere of influence within their school, district, and region
- Develop targeted solutions that build upon assets and address current challenges within Tennessee’s rural communities

Cohort members interact with work-alike groups that concentrate on a specific area of focus: Community & Postsecondary Partnerships, STEM Integrated Curriculum & Instruction, and Family Engagement. For each area of focus, participants engage in targeted professional development and have the opportunity to meet experts in the field.

Educators receive a stipend for participating and additional funding towards classroom implementation.

In the 2020-2021 program year, 11,328 students across the state were impacted by this work. Evaluated by the Center for Research in Education Policy at the University of Memphis, we found that:

- 98% of teachers felt confident in their ability to assess student learning in STEM after participating in the program.
- 78% of students surveyed now know of STEM jobs in their local communities and 74% feel more confident that they could succeed in a STEM field.
- 100% of community partners said engaging with students through STEM activities is a meaningful way to support the community.
- 94% of parents said they have a better understanding of STEM education and think it is important for their child to explore.

In 4 Years of Implementation...

185 Educators have been trained, 154 Schools are represented, and over 39,028 Students have been impacted.
Yvonne Schlangen
Creek Wood High School / Dickson County

Yvonne Schlangen is a Special Education teacher turned Science & Computer Science teacher at Creek Wood High School in Dickson County. In joining the Rural Stem Collaborative, Yvonne hoped to collaborate with colleagues that have a similar desire to change rural communities through STEM opportunities. Through a health and wellness survey, Yvonne hopes that her project will become a resource that brings unity and growth through wellness for her community.

Can you provide an overview of your STEM initiative?
YS: My students developed a website to help raise community Health and Wellness awareness. The students developed a survey that helps community members determine where they should start their health journey: Diet, Exercise or Mental Health. This online tool is developed and supported by community members for community members.

You describe your role in the project as that of a facilitator with your students taking charge of most of the research and online resource development. What impact has your project had on your students’ engagement (and interest) with computer science and their larger community?
YS: Yeah, WOW! I have to say it turned out so much better than I had anticipated. The core of the students are Special Education students working on the Alternate Academic Diploma (AAD) program. I had two 9th grade level Mentors to assist in the development and I JROTC Senior Advisor that would collaborate with me to lead the project. The impact was noticeable from the beginning: it was that student-led PBL environment we all dream about. Students teaching students...not to mention better than what I could have done myself. It pushed them all out their comfort zone, and they used each other’s strengths to their advantage. The website became their baby...they even developed a mission statement. I just have been in awe from the beginning; they are an amazing group of students.

Your project also mentions the importance of equitable STEM educational opportunities for students. Can you speak a little more about that?
YS: My main goal was to have an opportunity to develop a program or project that focuses on equity. Here at Creek Wood High, it is something I feel we pride ourselves on—bridging that academic gap. I wanted to take it even further than just inclusion. I wanted a class where you could not tell who had an IEP/504 or disability. You only see students growing and engaging at their academic level, achieving new and exciting things through STEM. Having my AAD students be part of this project proved that when a student has the right supports in place, they have the same chance to succeed as their peers, and that is making sure EVERY student has an equal chance to grow and develop and bring them that much closer to their dreams.

Do you or your students have any ideas for where you see this project going in the future?
YS: They would love to see the survey they created become an app that is being used by more than just our county in the future. Knowing where to start on your health and wellness journey is important for everyone at any age. They want their work to be that change in the community. These students want to help their community focus on living longer, healthy lives.

What would you say to a teacher or administrator who is unsure about applying to this program?
YS: DRINK the KOOL-AID...you will not regret it! This will change your students’ lives! The Five C’s - critical thinking, collaboration, creativity, communication, and character - that’s what you get to explore in this program. This experience is foundational for our students’ future.

"The students came together, put a goal in place, and just went at it. They are the heroes in the journey, not me. I just gave them the fuel... they drove off! The TRSC program did the same for me."
Quanta Hess
Lakeland Preparatory School / Shelby County

Quanta Hess is a 6th grade STEM & Science teacher at Lakeland Preparatory School in Lakeland, TN. After educating middle school students for the past 15 years, Quanta was looking to participate in a professional learning environment where she would be able to share big ideas and gather suggestions from other big thinkers. After partnering with several police departments and agencies, Quanta was able to introduce her students to the complexities of forensic science in a real-world setting, leading to the development of CSI Crime Scene Story videos by each student.

"As a 21st Century educator, I feel proud watching my students in action learning and applying set STEM disciplines that were fun, challenging, and applicable to the real world."

Can you provide an overview of what you did for your project?
QH: Forensic scientists are needed now, more than ever! If you stop to think about it, the number of TV shows portraying the life of a CSI agent have grown exponentially, so we decided to dig deeper. We researched the position, salary, certification, schools, and training needed. The best part is that the students were able to gather information from local experts. The goal was for students to design and reconstruct their own (individual) crime scene investigation, and demonstrate how to collect, preserve, and analyze forensic evidence. Training included “Private Eye” loups and a ridge counter to help them conduct a more accurate fingerprint analysis. Students created a CSI ID badge and demonstrated what they learned by writing a script and casting themselves in their very own crime scene story.

How did you come up with the activities that your students would be engaged in?
QH: To keep students engaged, I knew I had to keep things ever changing, so I partnered with several different community law enforcement agencies who agreed to help provide our students with real-word CSI exposure. Students discovered what the day-to-day was like for CSI agents, witnessed the inside of police precincts, and one agent even allowed us to view the inside of their information technology labs. The students were so amazed learning about fingerprint patterns & characteristics. The sheer excitement of processing their own latent fingerprints won them over with interest!

Wow, can you talk about how you built these connections with community partners?
QH: Building relationships is key. We met several times to discuss appropriate training for 6th grade students and collected their professional thoughts and ideas for the overall direction of the project. Each community law enforcement agent made themselves available to students, multiple times, to answer any questions relevant to the student’s project goals.

Do you have any ideas for where you would like to see this project go in the future?
QH: Yes! In fact, I have already contacted a Fayette County law enforcement agent and can’t wait to add on the additional component of cyber security to this STEM initiative. Getting students exposed early to STEM career fields will help improve their STEM skills and help prepare them to be workforce ready!

What would you say to a teacher or administrator who is unsure about applying to this program?
QH: This collaborative cohort definitely stimulated new ideas for me, and everyone’s input definitely helped make my big dreams a reality! For those who have creative ideas but are uncertain of where to begin, this program not only provides the springboard for realizing those dreams but also the safety net needed to take those steps.

"It appears that everyone wanted a piece of the action and was thrilled to help support our students in their reconstructed crime scene efforts: mom, dad, siblings, and even the family pet were cast in videos."
Ashley Warnement is a Kindergarten teacher at Jack Anderson Elementary School in Sumner County. She joined the Rural STEM Collaborative with the goal of creating a space where kindergarten and first-grade students could become more engaged within their school community. Ashley’s project turned into a community effort that involved community partners, other teachers in her school, parents, and most importantly students as they developed a student-designed sensory walk.

"I have several kids in my classroom with autism and watching them not just play next to but actually physically interact with their friends has been like, yes, this is what we want to do."

Can you provide a brief overview of the idea for your project?  
AW: The kids designed a sensory walk for our school that every child can benefit from. Students were shown examples of sensory walks and provided feedback and suggestions for the features they would like to see in their school. Students went out and walked the space while brainstorming ideas. Students even prototyped the design using paper that was to scale. They were really engaged and excited sharing, “This is what we want. That’s what we want to do with our bodies while we’re outside.”

How did you come up with the idea of creating a sensory walk?  
AW: The pandemic presented many challenges, one of those was how to keep kids active and socially distant. We have a big, beautiful field, but it gets muddy often. I brainstormed ways to fill this gap and remembered growing up, we had a playground that had tires as well as other engaging features. I wondered how can we create something that everyone, including our students with autism and sensory needs? I collaborated with our art teacher to develop the idea.

Can you talk a little bit more about how you introduced partners to your project?  
AW: I started with just talking to the community members within the school: the kindergarten teachers, the first-grade teachers, and asking, “what do you see a need for?” This branched into our STEM teacher, which branched into our art teacher, and then expanded to the Chamber of Commerce. That conversation led me to Lowe’s, which donated all of our paint for the sensory walk. It was a true collaborative eff ort with many minds behind the idea.

How do you see this sensory walk continuing into the future?  
AW: In terms of sensory needs, we would like to expand this project to include a mural, additional ground games, and maybe even a chicken coop in the future. There was enough wood left over that one of our parents built a stage so the kids can dance and sing. The teachers even do presentations/lessons on the stage. I would love to get the local high school involved to help us explore new ideas.

What would you say to a teacher or administrator who’s unsure about applying to the program?  
AW: Just take the leap! This program has been one of the best things in my teaching career because this is a project that I get to watch grow and change. You get to see all these people excited and involved in your project. You can’t be afraid to just jump, you know, don’t be afraid to hear no.

"It was fun to see what other cohort members are doing for their STEM focus because you get a holistic view of possibilities. It was nice to see what other people were doing and that fueled new ideas for me."
Kristy Phillips is a chemistry teacher at Clinton High School in Anderson County. As a teacher who likes to challenge her students to shape the world by becoming successful leaders of the future, Kristy joined the Rural STEM Collaborative to provide her students with a STEM project that featured a real-world problem. After working with students on the implications of recycling, Kristy worked with a local partner to create a recycling awareness campaign.

"I wanted my students to gain independence and confidence from this STEM project, which are very valuable life skills."

Can you briefly describe your project?
KP: The title of my project was ‘Recycling our Ferrous and Nonferrous Metals.’ Students had the opportunity to discover, research, and build foundational knowledge around recycling ferrous and nonferrous metals and the importance. Each student was given an uncommon item to research and recycle. Their task was to figure out what all could be recycled if they broke down their item. We worked hand in hand with a new community partner, Scrap Metal Solutions.

How did you keep the students engaged throughout the project?
KP: The student experience began virtual tours of several scrap yards, and then each student was given an uncommon item to research and recycle. Students researched how to break down their item into all possible recyclable parts. Each student had a one-on-one Zoom call with an employee from Scrap Metal Solutions to ask questions. After conducting the research, students then presented their findings to the entire class. Over winter break, Scrap Solutions gave back to the kids by saying, “hey, we want you to go further in life and do this over Christmas break, so here’s a competition to see who can recycle the most. We’re going to give $100, $75, and $50 to the winners so that you can also make money.” That was amazing.

Can you talk a little bit more about how you developed connections with your local community?
KP: Scrap Metal Solutions employees and I collaborated to come up with an essential question for the project. I visited their site and toured the facility to see the recycling process that they follow. This helped me explain the recycling process so students would know what happens when you take objects to the recycling facility. Working with a wonderful and helpful company allowed the project to flow smoothly. Developing this partnership with Scrap Metal Solutions is a homerun for Clinton High School.

Has this project led to any other ideas (by you or your students) for continued STEM engagement outside of the classroom?
KP: The students have discussed the idea of contacting local homeowners’ associations about scheduling a once-a-month scrap pickup. We have also discussed setting up a recycle bin at each school within our school district.

What has been the most valuable aspect of this program for you?
KP: I have enjoyed watching the students become so engaged in learning and be excited to continue what they have learned for years to come. I am also thankful for the community partnership that has been created with Scrap Metal Solutions and I am looking forward to doing a lot more with them in the future.

What would you say to a teacher or administrator who is unsure about applying to this program?
KP: I would highly encourage them to complete the program! I have gained not only a valuable community partnership, but incredible knowledge from peer teachers across the state. I have also enhanced my understanding of STEM and learned about valuable resources to use both inside and outside of the classroom. I learned and took away so much from every session. This by far is the best PD session that I have ever enrolled in! Thank you TSIN for providing this amazing opportunity!

"Developing a partnership with Scrap Metal Solutions is definitely a homerun for Clinton High School and the students of Clinton High School."
Margie Branstetter is a Pre-K teacher at Petros Joyner Elementary School in Morgan County. Margie was encouraged to join the TRSC by her administration. Margie was particularly excited about finding new ways to integrate STEM in her classroom, the opportunity to network with other teachers, and the resources available through the Rural STEM Collaborative. With an interest in animals, Margie and her students created a monarch butterfly waystation for her school community where students raised caterpillars, grew milkweed, and tagged butterflies.

"With the students, it became more than teaching them the lifecycle - they're excited because they're in the middle of it."

Can you describe your project and what you were hoping to accomplish with your students?
MB: We wanted students to learn the Monarch butterflies’ lifecycle and the lifecycle of plants because we were going to be raising milkweed. We looked at how butterflies live, what they need to survive, how to classify them, and the importance of protecting them. That was a big thing for me—I wanted the students to learn how to protect our natural resources. We wanted the students to become investigators and scientists through hands-on activities.

Can you talk a little bit more about the community engagement aspect of your project, maybe some of the partners that especially stood out for your project?
MB: From connections with parents and community partners, we found folks that were open to helping us construct a butterfly garden as well as local nurseries in our county that taught us the foundational knowledge needed to make this project successful. We also engaged the third graders at our school to research about caterpillars, butterflies, and what plants are needed to feed them. Third grade also helped to raise some of our Monarchs, and we ended up tagging them all together.

What do you think was the most exciting part of this project for you as a teacher and for your students, as well?
MB: Well, for the students it was raising the Monarchs and watching that last lifecycle. When the Monarch caterpillars were in the chrysalis stage and had just opened into the butterfly, the students were so excited about that. That’s what excited me too—just seeing how life changes.

How do you see the butterfly waystation continuing? Has this project led to any other ideas by you or your students for continued STEM engagement outside of the classroom?
MB: We’re going to continue to compost in in our classroom and then add that to our garden. I’m just really excited to continue with our garden. We’re hoping to add another little garden and have more vegetables, possibly things that the students can try to eat. This program gave me the confidence to apply for other grants to keep adding things to our classroom. Hopefully next year, we’ll have a butterfly garden that my kids can fully use.

What have you enjoyed the most about the Rural STEM Collaborative?
MB: I really liked the resources, especially the start up funding. I also just learned a lot more about the place of STEM in the classroom from the activities within the program.

What would you say to a teacher or administrator who is unsure about applying to the Rural STEM Collaborative?
MB: I’d say go for it! The program can help you find quality resources and connects you to a network of teachers across the state. For me, the program made me feel more comfortable applying for other grants and incorporating STEM into the classroom.

"If we teach the kids young, then they'll protect our resources, so they're more interested in ways to protect the butterflies, caterpillars, and all living things."
**Sonya Hatfield**  
Oliver Springs High School / Roane County

Sonya Hatfield is a STEM teacher at Oliver Springs High School in Roane County. As a newer STEM teacher, Sonya applied to be a part of the Rural STEM Collaborative so that she could connect with other teachers who share her passion for STEM and who would introduce her new activities and instructional skills. After asking students and colleagues at her school to identify the biggest need, Sonya collaborated with club sponsors to create a plan for a school club that would make STEM projects a reality.

"I have truly enjoyed seeing all the other projects and ideas. It has inspired me to keep building our program and expand what we do."

**Can you provide a brief description of your project? What were you hoping to accomplish?**

SH: My project is a Young Women’s Engineering Club. The goal of our program is to expose our young women to a variety of activities that involve STEM and Engineering concepts and job opportunities that are not typically thought of as female jobs. These concepts included circuits, programming, cybersecurity, and our major project of building an electric car that we hope to compete with in the future. This project is very student driven. The activities were led by the young ladies and their interests.

**Can you talk more about the ways that you have involved your local community in the design and development of your projects?**

SH: We have had to really rely on community sponsors to help fund this program, specifically the Greenpower USA race car. We also have a sponsorship for a sub atmospheric balloon experiment that we hope to implement soon. Due to COVID, we have not had outside people come in to help with our program, but we plan to have outside speakers and professionals come in to talk to the girls and do experiments with them as well.

**Has this project led to any other ideas (by you or your students) for continued STEM engagement outside of the classroom?**

SH: I hope in the future that our young ladies will be able to go out into the community and develop projects that will impact and improve the community they live in.

**What would you say to a teacher or administrator who is unsure about applying to this program?**

SH: DO IT! This program will help you go from an idea to a completed project. They meet you where you are and then help you go to the next level. They have been able to lay out this program so that it supports teachers in ideating solutions to local needs. The connections and ideas that you gain from this program are amazing.

"I hope in the future that our young ladies will be able to go out into the community and develop projects that will impact and improve the community they live in."
To further build leadership capacity, three TRSC cohort alumni were selected to serve as regional leads for west, middle, and east Tennessee. They supported cohort members in the development of their STEM projects while providing thoughtful feedback and coaching. Each regional lead engaged with their cohort through multiple touch points throughout the program experience. Their perspectives are vital to ensuring rural educator needs are being addressed throughout the program.

**WEST TENNESSEE**
SHARON CLARK
STEAM Educator at Sunny Hill Intermediate School in Haywood County

**MIDDLE TENNESSEE**
AMY HERSHMAN
Kindergarten Educator at Hickson Elementary School in Coffee Co.

**EAST TENNESSEE**
JEANA GRAY
Lead STEM Educator at Fort Loudoun Middle School in Loudon County

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**ASHLEY LONG**
Highland Elementary in Greene Co.
Family Engagement & Fun through Take-Home STEM Kits

**ASHLEY NIVENS**
Oliver Springs Middle School in Roane Co.
Electrifying STEM Education through High-Energy Exploration

**BRITNI CARTER**
Oliver Springs Middle School in Roane Co.
Designing take-home STEM Activities for School Competitions

**BRYAN WILLIAMSON**
Sequoyah High School in Monroe Co.
Hands-on STEM Career Exploration through Community Partnerships

**EMILY HURST**
Soddy Daisy Middle School in Hamilton Co.
Improving the Community through STEM Inventions and Competition

**JANET NORTON**
Dandridge Elementary School in Jefferson Co.
Exploring STEM Integration

**JUSTIN WOODY**
Sequoyah High School in Monroe Co.
Hands-on STEM Career Exploration through Community Partnerships

**LORI BLANCHARD**
Cosby Elementary School in Cocke Co.
Girls exploring STEM careers through community partnerships

**MARGIE BRANSTETTER**
Petros Joyner Elementary School in Morgan Co.
Integrating STEM: exploring the lives of Monarch Butterflies

**MEGAN HENSLEY**
Petros Joyner Elementary School in Morgan Co.
Integrating STEM exploring the lives of Monarch Butterflies

**MICHAEL CHAFFIN**
Prescott South Middle School in Putnam Co.
Using STEM in Radio Broadcasting

**RACHEL HORTON**
St. Clair Elementary School in Hawkins Co.
Family STEM Night Challenges Meet School Competitions

**SARAH DANIELS**
Avoca Elementary School in Sullivan Co.
Thinking Like an Engineer through Design Notebooks

**SHERI STILTS**
Pine Haven Elementary School in Fentress Co.
Community Engagement through Student-Created STEM Games

**TANYA FOX**
Gainesboro Elementary School in Jackson Co.
STEM Exploration in Real-Life PBL Projects
AIMEE SHIERES  
Battle Creek Middle School in Maury Co.  
Girls Discovering STEM through Projects and Career Exploration

HEATHER LUNSFORD  
South Middle School in Franklin Co.  
Making STEM Meaningful through Renewable Energy Projects

TERESA ASHWORTH  
McDowell Elementary School in Maury Co.  
STEM Ambassadors

SUSAN MURRAY  
Selmer Middle School in McNairy Co.  
Designing STEM Activity Boxes for the Community

AMANDA MCBRIEDE  
Bedford County Learning Academy in Bedford Co.  
Engaging with STEM through Coding & Robotics

JENNIFER WILKERSON  
Springfield High School in Robertson Co.  
STEM awareness through an ‘Alumni in STEM’ Hall of Fame

JOSEPH (ANDY) ZIMMERMANN  
South Fulton Middle/High School in Obion Co.  
Partnering with the Community to Design Humble (Tiny) Homes

ANNETTE DEGEORGE  
Randolph Howell Elementary STEM Academy in Maury Co.  
Learning about STEM through a Farm-to-Table Community Garden

JESSICA GUESS  
Franklin County High School in Franklin Co.  
Preparing students for STEM Careers

ANNEMARIE LAMPRIGHT  
Lawrence County School District  
Exploring STEM through The STEM Bus

MARTHA MOWELL  
Mt. Carmel Elementary in Hawkins Co.  
Increasing STEM Interest through ELA and Innovation

ASHLEY WARNEMENT  
Jack Anderson Elementary in Sumner Co.  
Community Partners come together for a STEM-themed playground

KIM MULLINS  
Bethel Springs Elementary School in McNairy Co.  
Designing STEM Activity Boxes for the Community

CATHY BRYANT  
Avoca Elementary School in Sullivan Co.  
Thinking like an Engineer through Design Notebooks

BRYAN MORGAN  
Portland West Middle School in Sumner Co.  
Exploring Robotics through VEX

LEANN SIMMERMAN  
JE Woodard Elementary School in Maury Co.  
STEM Bins for STEM Immersion & Career Exploration

YVONNE BARBOSA SCHLANGEN  
Creek Wood High School in Dickson Co.  
Integrating Coding into improving Community Health

CAROLYN DAWSON  
Mt. Juliet Elementary School in Wilson Co.  
Bringing Families Together for Family STEM Night Challenges

LISA SLUSHER  
Battle Creek Middle School in Maury Co.  
Girls discovering STEM through Projects & Career Exploration

MARLA BELYEw  
Briarwood Elementary School in Benton Co.  
Integrating STEM in the Development of Wind Turbines

AIMEE SHIEERS  
Battle Creek Middle School in Maury Co.  
Girls Discovering STEM through Projects and Career Exploration

MICHAEL SETH WOODARD  
Mount Pleasant High School in Maury Co.  
Collaborating with the Community for a Splash Pad Water Feature

NATHAN NICHOLAS  
Milan Middle School in Gibson Co.  
STEM Robots to Explore Potential Careers

CATERINE HEATON  
Decherd Elementary School in Franklin Co.  
STEM Lab in a Bag for Agriculture & Aerator Exploration

DOVIE MACPHERSON  
J.E. Woodard Elementary School in Maury Co.  
STEM Bins for STEM Immersion and Career Exploration

RACHEL CUNNINGHAM  
North Middle School in Franklin Co.  
Bridging the Gap between PBLs and STEM Standards

QUANTA LOFTIES SPEARS  
Lakeland Preparatory School in Shelby Co.  
Community Partnerships to Bridge STEM and Forensic Science

STACEY JONES  
McNairy Central High School in McNairy Co.  
Designing STEM Activity Boxes for the Community

RYAN LEWIS  
South Pittsburg High School in Marion Co.  
Exploring Careers in Engineering

VANESSA ANDERSON  
Dyersburg Middle School in Dyer Co.  
Engaging with STEM through ‘STEM in a Sack’

KRISTY PHILLIPS  
Clinton High School in Anderson Co.  
Integrating STEM by Recycling through Our Metals
Participating Counties
2017-2021