Engaging the Future of Safety Science

Fellowship Story Collection

How UL Research Institutes' Xplorlabs Educator Fellows are transforming their classrooms

UL Research Institutes | Research Experiences & Education

2026

Xplorlabs Educator Fellowship

The Institute for Research Experiences & Education believes that scientific inquiry in the context of real-world phenomena builds the foundation for a safer, more sustainable future where people are equipped with the knowledge and skills to think critically about the world around them.

The Xplorlabs Educator Fellowship provides professional learning experiences with peers and leaders in education as well as UL Research Institutes' safety science experts.

Alongside partners at Arizona State University's Mary Lou Fulton College for Teaching and Learning Innovation and Penn Engineering's Cora Ingrum Center for Community and Outreach, we reinvigorate and support educators as they create experiences using Xplorlabs that address their standards. The yearlong program includes an active cohort of middle and high school classroom and informal educators from across the country.

This collection of stories is a testament to their expertise, innovation, passion, and impact on their students, classrooms, and communities.

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Educator Fellowship 2025-2026

Continued ›

Doing School Differently

By Janet Ankrum

7th-8th Grade STEM, Social Studies, English Language Arts

Phoenix, Arizona

Meet Bibi and Jamilah, two typical middle school girls who, at the beginning of the 2025-26 school year, were shy and insecure about their place in life. Over time, they grew into neighborhood champions through their work and partnerships in the local community. Bibi and Jamilah carried the legacy left by former students Itzel and Andrea, who started a campuswide community battery collection, installed portable recharge stations inspired by our agrivoltaic gardens, and created a student-led sustainable recycling program.

Follow Bibi and Jamilah through their fire safety adventures anchored in action-oriented pedagogies and Xplorlabs pathways

Ignited by the enthusiasm of their peer mentors, Itzel and Andrea, Bibi and Jamilah got straight to work this year as Xplorlabs Youth Fellows. They first designed a needs assessment survey for grades 5-8 to collect data on last year's community impact project. They used this data to plan classroom lessons that would lead to future sustainable impacts on campus.

Bibi and Jamilah co-designed and co-presented daily lessons with my support. Using Xplorlabs resources, students solved real fire investigations and came to understand the hazards that lead to thermal runaway in lithium-ion batteries. Students used authentic "shop talk" and academic vocabulary in their respective roles as investigators, artists, and reporters. All students in the STEM class then applied their scientific knowledge to design a container that could protect batteries in a common playground scooter from thermal runaway.

It is important to note that their work on this project was ignited by the work of previous students: what a legacy of learning! The class shifted away from their specific work and began imagining safer, greener, more just and inclusive futures that were informed by their learnings. Not only did students use scientific knowledge to drive their projects, it was transformative for them and their communities — they began thinking about mitigating fires, promoting safer behaviors with lithium-ion batteries, and as a result of their knowledge, they experienced a "flashover" of confidence.

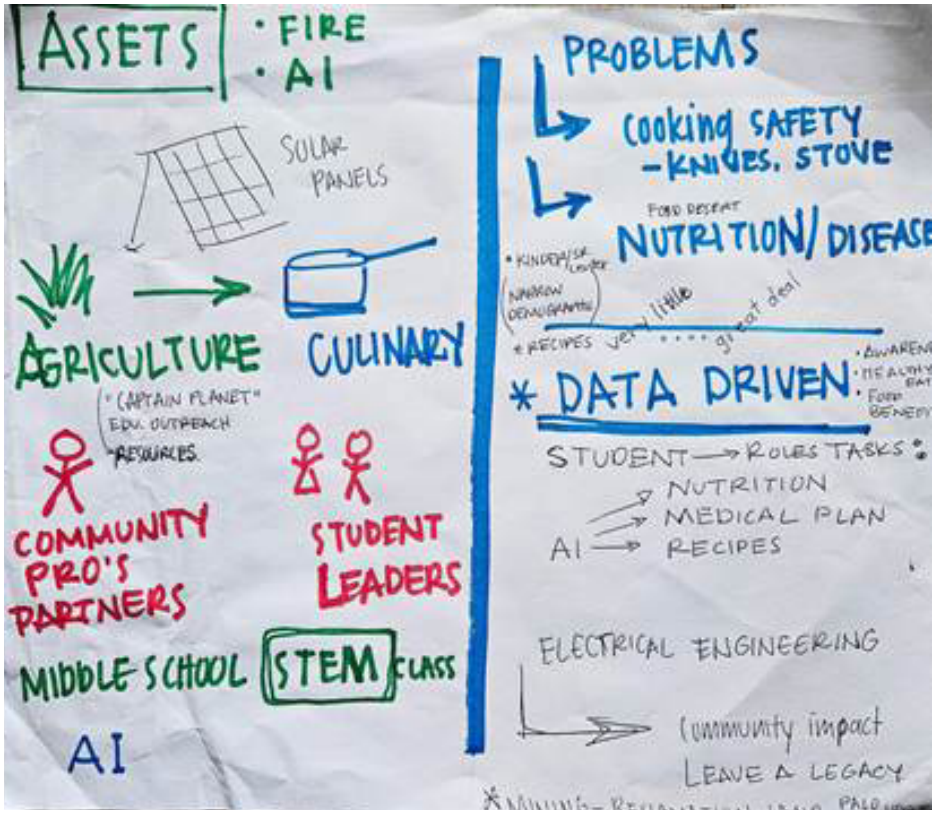
Bibi and Jamilah planning for learning and action for the 2025-26 school year.

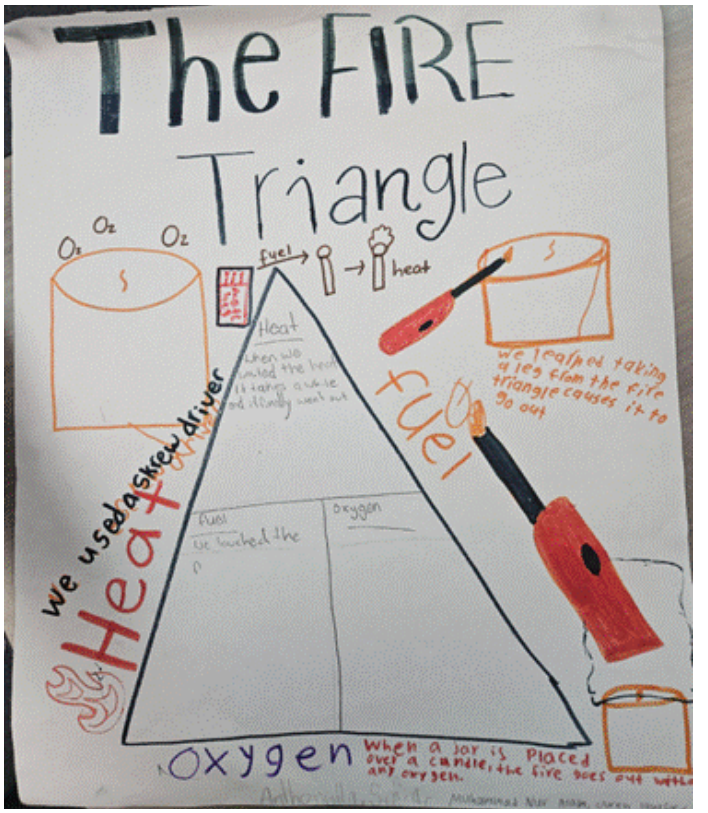
"Fire safety is not just about controlling fires, it also connects to saving lives, which is exactly what I want to do in my future career, which is to become a doctor." –Jamilah

We continued the conversation by generating ideas about assets — what we notice and wonder about fire in our community. As we looked more closely at our surroundings, patterns began to emerge: scooters, vapes, house fires, the sound of local sirens, and even dead batteries that aren't being recycled. These observations helped ground our thinking in real, everyday experiences. From there, Bibi and Jamilah led the class through an important discussion, asking questions like, "Where is our circle of influence? What community do we impact?" The answers to these questions helped us all move from simply noticing problems to considering how we might take meaningful action. Their learning in the classroom was more than transactional — it was a living, breathing, growing body of knowledge that inspired compassion for and action in their communities.

Our safety science learning transformed into action through imagining futures. This process sparked deeper thinking and creativity, and that's when our ideas really began to branch out — like the veins of a leaf spreading in different directions. Individual passions from other students started to emerge. Each idea grew from a shared foundation of knowledge built by Bibi and Jamilah's leadership and developed into something unique that was driven by personal interests, concerns, and hopes for the future.

To accommodate these varied interests, we established more community partnerships like





Students work and plan around safety and sustainability action during the 2025-26 school year.

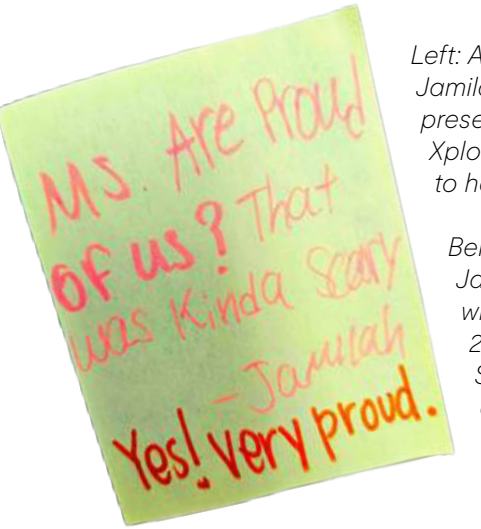
Canopy for Kids, a program collaboratively run by Arizona State University, the City of Phoenix, and Watershed Management Group. Canopy for Kids supports schools in planting trees and harvesting rainwater to irrigate them. This work connected to student interests regarding carbon offsets, cooling campus, and reducing fire risk by retaining ground moisture. Myself, Bibi, and Jamilah, and more than 15 other students also hosted around 20 teachers for a National Growing Garden Summit, where students led stations that demonstrated their learning about fire safety, cooking, agriculture, and engineering — all using AOP methods.

Through our partnerships and our work with Xplorlabs resources this school year, students have developed interests in mining on Navajo land, contacted local representatives about mining regulations, created kitchen safety guides for the school cooking club, organized a recycling drive to help community families properly dispose of electronic waste and batteries, taught fire safety lessons to students in younger grade levels, and more!

Ignite. No one works alone.

Real impact is forged by partnership — through this fellowship, Arizona State University, UL Research Institutes, the Phoenix Fire Department, communities, families, and students came together with a shared purpose.

Like a network of flames, every time we revisit the work of a previous class it strengthens the next — spreading and sustaining energy, resilience, and light far beyond what any single spark could achieve. ■



Left: A note from Jamilah after presenting an Xplorlabs lesson to her classmates.

Below: Bibi and Jamilah posing with me at the 2025 Arizona Science Teachers Association.

Rebuilding Our Sonoran Desert Ecosystems

By Ruben Carroll

10th-12th Grade Environmental Science Teacher

Goodyear, Arizona

Why should students learn about native habitats?

Habitats all around the world are being destroyed or modified to the point that they will not support the native species that have lived there for thousands of years. This has led to a massive decline in insects, amphibians, birds, mammals, and more, with scientists referencing it as the sixth mass extinction. There are many factors that have contributed to this, including agriculture, urbanization, and mining.

As an Xplorlabs Educator Fellow this year, I sought to teach students about this issue. Through the Xplorlabs Modeling Mining Processes Investigation, my high school environmental science students were able to see habitat degradation caused by mining, while also recognizing that mining is necessary for many aspects of our lives and the future transition to electrification and renewable energy. I encouraged students to take action on this complex issue, which has turned into a year-long — possibly longer! — effort.

Since we don't live in close proximity to a mine, we decided to restore habitats in our neighborhoods. Our project is designed to turn our surrounding neighborhood yards back into the Sonoran Desert. We will seek to bring back the flora (plants) to our yards in hopes that this will bring back and support the fauna (animals) that used to exist there — like the desert milkweed and brittlebush, which will bring back the monarch butterflies and white-lined sphynx moth.

Compostable plant pots at Desert Edge High School.

To do this, we will be planting and growing native plants in the classroom that will be distributed to one of our local neighborhoods. If successful, this project can be repeated each year to bring these plants to other parts of the community as well.

Impact on students

In addition to restoring habitat and helping solve the extinction crisis, this project is intended to give students agency and confidence in their ability to change their community for the better. Environmental science can be filled with doom and gloom statistics and predictions for the future. It is important for students to understand this reality, but it is equally important for them to be given hope in their ability to change the trajectory of our current path. Students, especially nowadays, need to be doing more and not just be exposed to topics. Once they engage in their own futures, they take it more seriously. This gives them practice in things like communication, cooperation, planning, problem-solving, and creating the future that they would want to see.

Our native plant project is giving them a chance to change their community through their own actions. Who knows what this might lead to? Of course, the yards will have more native biodiversity, but maybe some of the students or community members will be inspired to do work of their own to further this cause and others.

Educators can impact thousands of students over a career.

Empowering our students to create change is much more impactful than one of us trying to tackle it ourselves.

Those students will spread their passion and learning to family, friends, and future generations. Xplorlabs and the team at Arizona State University are providing educators with inspiration, skills, and ideas that can help transform regular classrooms into spaces that fill youth with the courage and strength to change the place they call home — and that's something I'll always be happy to be a part of. ■

Saving the World — One Battery at a Time

By Marc Cohen

6th Grade Science Teacher, Science Lead/Testing Coordinator, STEM/Coding Club Coordinator

Philadelphia, Pennsylvania

When I first joined the Xplorlabs Educator Fellowship, I was excited — but also curious. Like many educators, I'm always searching for ways to make science feel meaningful and relevant for my students. The fellowship promised hands-on exploration and real-world STEM connections. What I didn't fully anticipate was how much those experiences would transform not only my classroom, but also how my students saw science in their everyday lives.

Making connections

One of the most memorable parts of this journey was watching students shift from passive learners to active problem-solvers.

When we began exploring lithium-ion batteries and energy storage, the topic initially seemed familiar but distant. Students use lithium-ion batteries every day — in phones, laptops, gaming systems, and increasingly, electric vehicles — but most had never thought about what actually makes them work. That changed quickly.

As we began investigating how batteries store and transfer energy, the energy in the classroom shifted as well. Instead of just listening, students were experimenting, observing, and asking questions. They tested materials, discussed ideas with their classmates, and began thinking more deeply about the science behind everyday technology.

One moment that stuck with me happened during a hands-on investigation exploring conductivity and energy flow. After watching the experiment footage from ULRI's Fire Safety Research Institute, a student paused, looked at the materials in front of them, and said, "Wait, the materials we choose determine whether the energy can move?"

They were getting it! That was when students realized that cellphones, because of their lithium-ion battery, can experience thermal runaway, as well as the risk they were taking by sleeping with their phones on their pillow. None of them do that anymore.

That realization — connecting a concept to something tangible — is exactly why hands-on science experiences matter.

The next step

As we continued exploring battery technology, our conversations expanded beyond how batteries work to why they matter. Students quickly realized that lithium-ion batteries play a key role in solving some of the biggest challenges facing our world today. Renewable energy systems rely on battery storage. Electric vehicles depend on advances in battery design. Even portable medical devices require reliable battery technology.

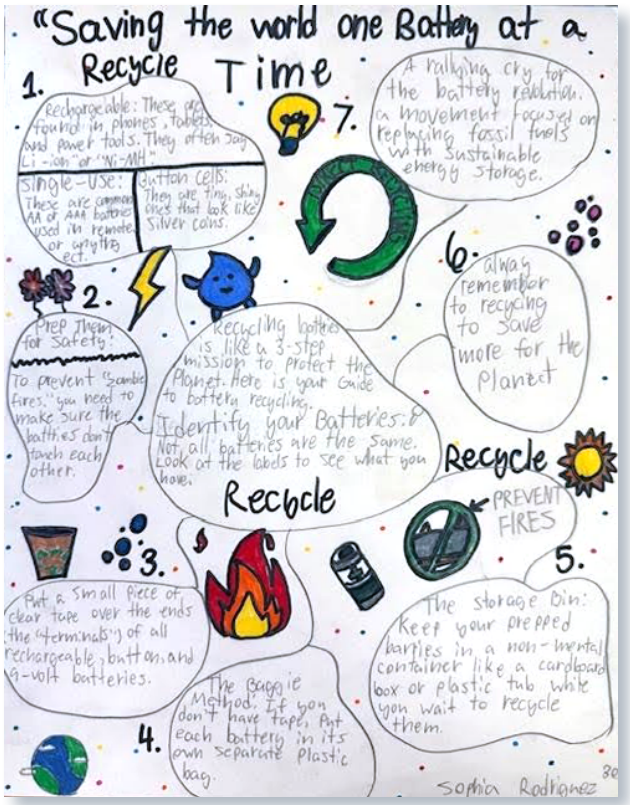
One of the most meaningful discussions came when we began talking about what happens to batteries after we use them. Lithium-ion batteries power many of the devices students rely on every day, but they don't last forever. That led us to explore an important question: What should happen to batteries when they stop working?

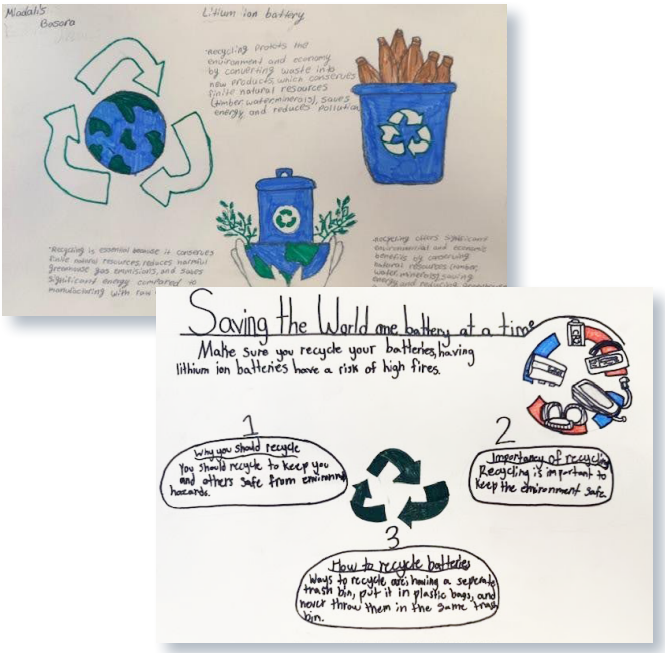
This conversation turned into a classroom investigation about battery recycling and sustainability. Students examined different battery types and researched the materials found inside lithium-ion batteries — elements like lithium, cobalt, nickel, and copper. They were surprised to learn how valuable these materials are and how much energy and effort it takes to mine them.

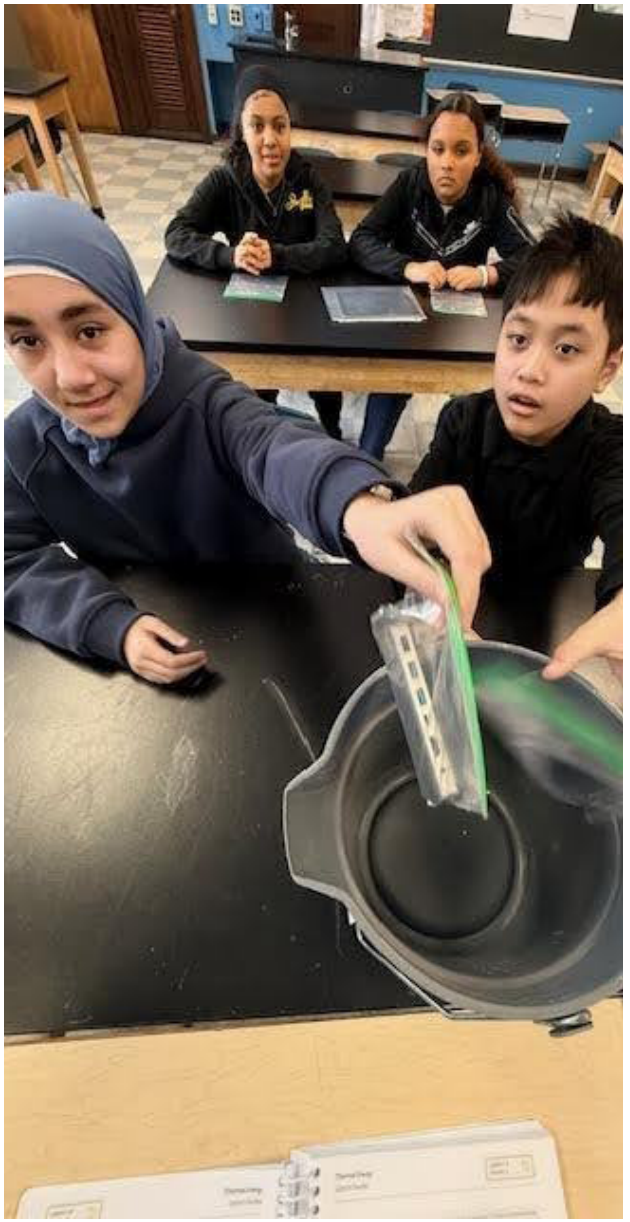
To help students think more critically about the issue, we conducted a small investigation comparing the environmental impact of producing new battery materials with the benefits of recovering those materials through recycling. Students analyzed information, discussed trade-offs, and brainstormed ways communities could improve battery recycling efforts. The conversations that followed were some of the most thoughtful discussions we had all year.

One student asked, "If we can reuse materials from old batteries, why aren't we recycling all of them?" Another student pointed out that many people probably throw batteries away simply because they don't know where to recycle them. That observation opened the door to a discussion about awareness and responsibility. Students were also surprised to learn that improperly disposed lithium-ion batteries can cause safety hazards. When crushed or damaged in waste systems, they can experience thermal runaway, potentially igniting and causing fires in garbage trucks or recycling facilities.

For many students, this was the moment when recycling became more than just an environmental slogan, they began to see it as part of a larger system — one that connects STEM, natural resources, and sustainability. Students were compelled to lead a battery recycling initiative in our school and community — collecting and recycling more than 300 batteries.







Teacher fellowship = student impact

Throughout the fellowship experience, I was reminded how powerful hands-on exploration can be. When students manipulate materials, test ideas, and analyze results, science becomes something they experience rather than memorize. Curiosity takes over, and learning becomes much more meaningful.

I also saw collaboration grow in the classroom. Students shared ideas, debated solutions, and helped one another interpret results. Some students who were usually quiet became leaders during investigations, while others discovered strengths in explaining concepts or organizing data.

Reflecting on this experience, one thing stands out clearly: When students see how science connects to real-world challenges, their perspective changes. They begin to see themselves not just as students learning science, but as potential contributors to solving real problems.

For educators considering opportunities like the Xplorlabs Educator Fellowship, my advice is simple: make room for curiosity and real-world discovery. Give students the freedom to ask questions, explore ideas, and connect their learning beyond the classroom walls.

Some of the most powerful moments in my classroom didn't come from a textbook. They came from students asking thoughtful questions and working together to find answers.

During one project, our principal stepped in and was struck by what she saw — students fully engaged, the classroom buzzing with activity, and piles of batteries, tape, and plastic collected for recycling. She saw it not as chaos, but as something incredible: a student-driven effort that connected the school to the community in a meaningful way.

Saving the world may sound like an enormous goal. But sometimes it starts with something small — students learning how a battery works, asking what happens when it stops working, and realizing they can be part of building better solutions.

One question, one experiment, and one recycled battery at a time. ■

By Samantha Daugherty
6th-8th Grade STEM Exploratory Educator
Woodstock, Georgia

From Content to Conscious: Using Xplorlabs to Give Meaning to What Matters

Before this fellowship: content

Before I joined the Xplorlabs Educator Fellowship, I was familiar with Xplorlabs resources that help incorporate safety science education in classrooms. I used them as part of the curriculum in my STEM exploratory class each quarter — 6th graders completed The Science of Thermal Runaway and 8th graders completed The Science of Fire Forensics as part of my required assignments. I had even been trained in partnership with our local fire department. I printed out the student guides provided, secured a classroom full of computers, and scheduled a week of time dedicated to completing those online modules. The resources were amazing! They provided such rich content and engaging interactive activities.

The lessons evolved to fabulous days with our firefighters, fire safety engineers, and fire investigators, filled with fire stories, lithium-ion battery stories, and engaging videos about the safety involved in these devices, but the days in front of the computer screens without class discussions and connections to peers were lacking engagement and meaning. And to top it off, my 7th graders got none of it … simply because I didn't include it in my lesson plans for them.

Tell me you've been there. Great resources, plenty of material and supplies, but the spark and excitement just weren't present. It's easy to put students in front of technology, but is it meaningful or impactful in reaching them?

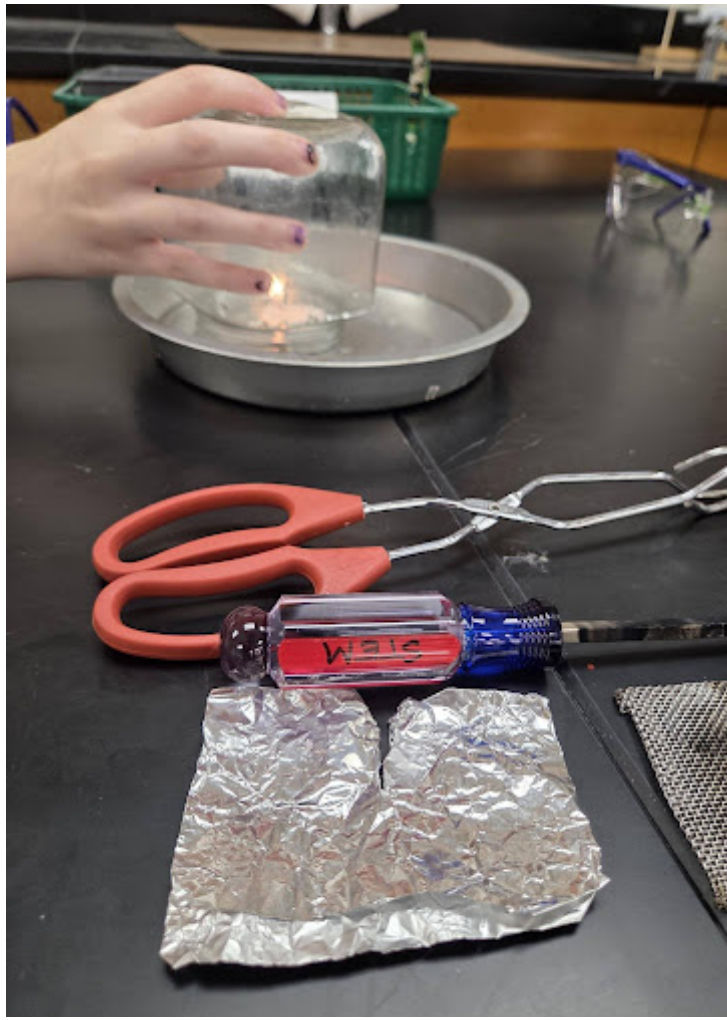
During this fellowship: connection

Enter the intervention: an invitation to apply for the Xplorlabs Educator Fellowship. A co-worker was part of a previous cohort and loved it. Why not? It can't hurt.

My very first journal entry conveyed my feelings: *"I am most excited about getting to know everyone and hear their varying backgrounds and work experiences. The ideas they are sharing already spark different perspectives and challenge my thoughts about incorporating the Xplorlabs material."*

The fellowship experience was everything I hoped, expected, and more. I knew I would get to engage and be immersed in the Xplorlabs resources further, and I knew I would enjoy meeting the other fellows and getting to know them. However, the experiences, comradery, and connection within our group went beyond my expectations.

Everyone was so dedicated and smart, such amazing teachers and professionals, so honest and positive, so sincere and authentic, and so willing to engage in the trenches of implementation and exploration of ideas.



It was surprising and exciting to see such varied personalities and backgrounds come together with common goals: the desire to collaborate in our careers and our "calling" in education, to encourage and uplift each other, to listen, offer constructive and meaningful feedback, and to support our efforts in the classroom at all educational levels.

It opened my eyes and broadened my worldview more and more with every conversation. I recall texting the group after one of our monthly meetings to state that "I find myself always sad to see our meetings end." The honest truth.

The Xplorlabs resources are not just curricular, they share universal ideals that can bridge gaps and influence real change in lifelong learning — for myself, my colleagues, my students, their families, and our communities. The combination of online resources, interactives, and hands-on investigations came to life at the Xplorlabs Educator Fellowship Summit during discussions and continued into online collaborative meetings throughout this fellowship. Every single opportunity we gathered together, a common theme emerged: these resources were stirring intrigue and leading to deep student buy-in and connection. We were each witnessing such phenomena in our classrooms across the nation.

The fellowship experience reminded me that, despite the common experience of learning in my classroom, my students are navigating vastly different lived experiences. It was truly joyful to spend time with the other fellows and to continue working and learning together. The work was good; the people were great.

Beyond this fellowship: conscious

Investigating and engaging in this fellowship experience has been extremely worthwhile. Safety science is the study and practice of making sure the products and materials we create and use in our world are not harmful for human use. It is an applicable science to our students' everyday activities and life processes. It's something they can automatically connect with and understand from every aspect of their lives no matter their varying ability levels, socioeconomic statuses, or prior knowledge. It is part of their real-world curricular needs in the classroom, and as a STEM exploratory teacher, I have the freedom and privilege to include it in my lesson planning. Safety science: not exactly an official standard, but definitely important enough to add to your curriculum for all students! If we incorporate safety science into our learning, we can impact safety and risk associated across all fields of science.

Xplorlabs provides resources that support incorporating safety science in an accessible and highly engaging way. The Xplorlabs Educator Fellowship provides a shared, encouraging community of educators to facilitate and continue that experience.

Not only have I increased my enthusiasm for these resources and revamped my lesson plans for my 6th and 8th graders, I've also gotten my 7th graders hooked on The Science of Extraction to E-Waste with a pretty cool cellphone project. Meaningful? Check! Impactful? Check!

This stuff matters. Take the next step. Do this for your students; do it for your professional growth; do it for yourself and for your legacy.

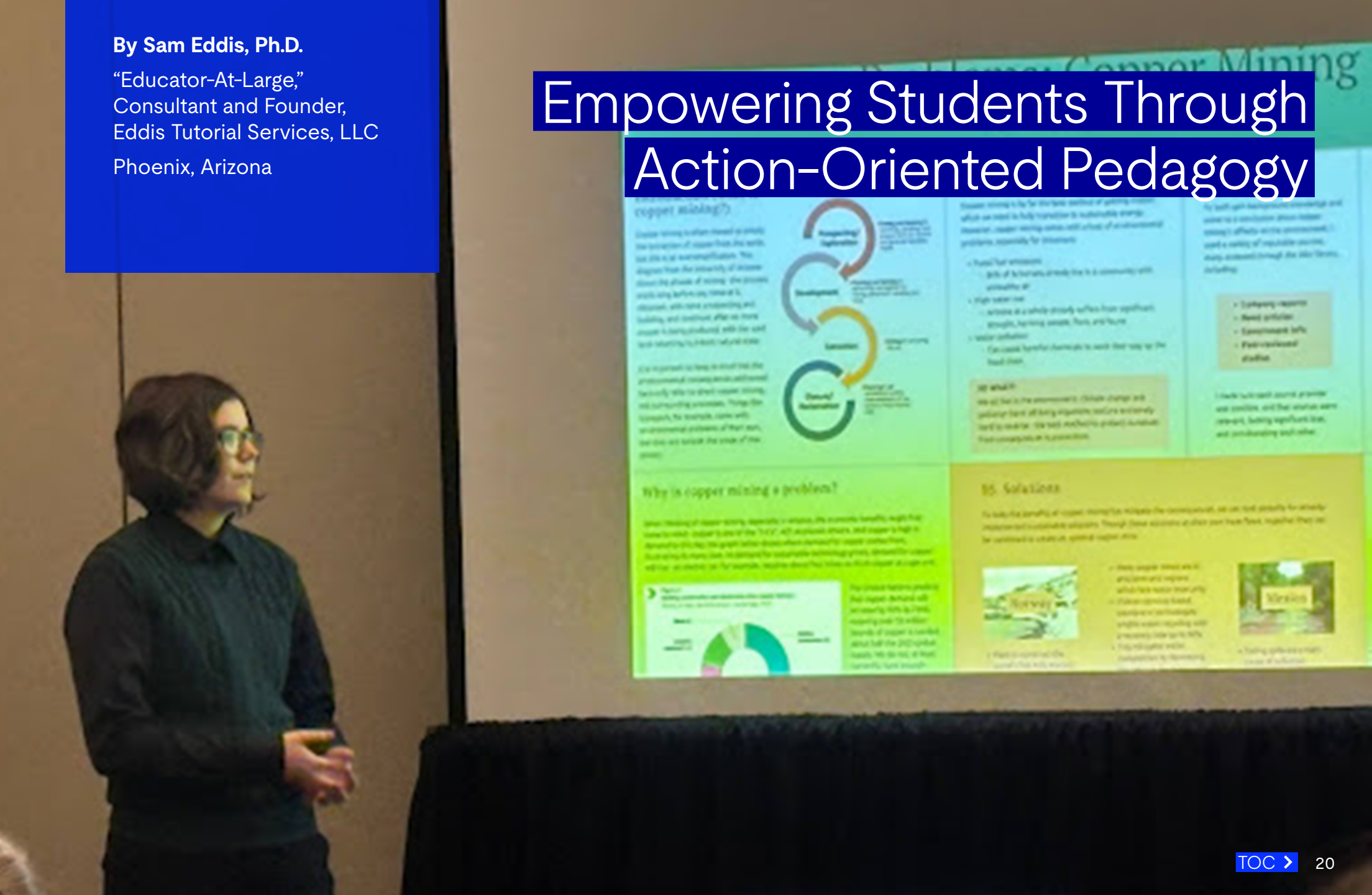
Join those using Xplorlabs' resources, focusing on safety science. Connect with others doing the same. You deserve this experience. ■

Empowering Students Through Action-Oriented Pedagogy

By Sam Eddis, Ph.D.

"Educator-At-Large,"
Consultant and Founder,
Eddis Tutorial Services, LLC

Phoenix, Arizona



How the fellowship started

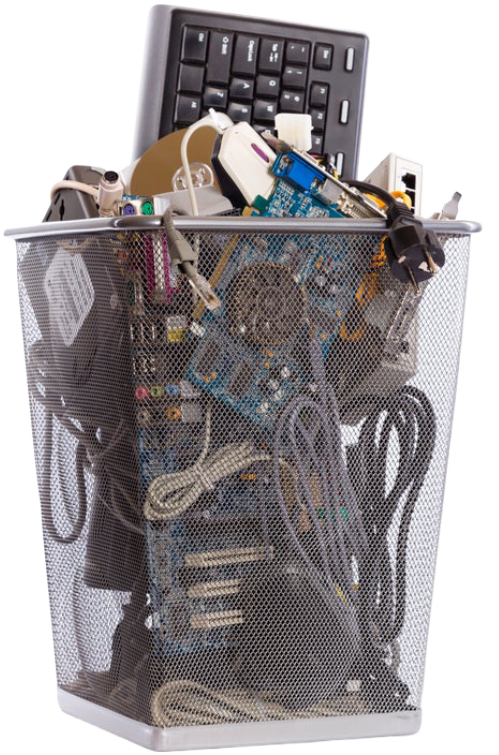
If I'm being honest, my journey with the Xplorlabs Educator Fellowship started with doubt. I wondered if I would fit in or if my teaching experience across multiple subjects and settings was too unconventional? Going outside of my comfort zone, I submitted an application for the fellowship opportunity with permission from my former school and two teachers to "borrow" their students to deliver stand-alone projects in the fall semester. As a result, I have had one of the most meaningful professional development opportunities and improved my own teaching practice.

Safety science, sustainability, and project-based learning

This fellowship reminded me that project-based learning has always been central to how I teach, and I had an opportunity to design projects that mattered. I wanted to give students research-based experiences with real-world significance. However, it was important to support the students' regular schoolwork without adding demands to their teachers. So, I collaborated with the teachers and the leadership team, creating two stand-alone projects, one for 11th graders and one for 7th-8th graders.

Both projects were research-based and included hands-on learning activities, using Xplorlabs to explore themes of safety science and sustainability. My goal was to use these resources as the catalyst for project-based learning experiences that connected classroom content with authentic issues. The 11th graders, working in teams of four, were tasked with investigating local issues with global significance. The 7th and 8th graders were introduced to chemistry and sustainability using a particularly relevant pathway, The Science of Extraction to E-Waste.

Some students wanted to know if they were doing the activities "right" or if there was a preferred way for them to create the presentation materials. I knew this productive struggle would challenge some of the students, so I encouraged them to embrace the messiness, and supported them without taking over.

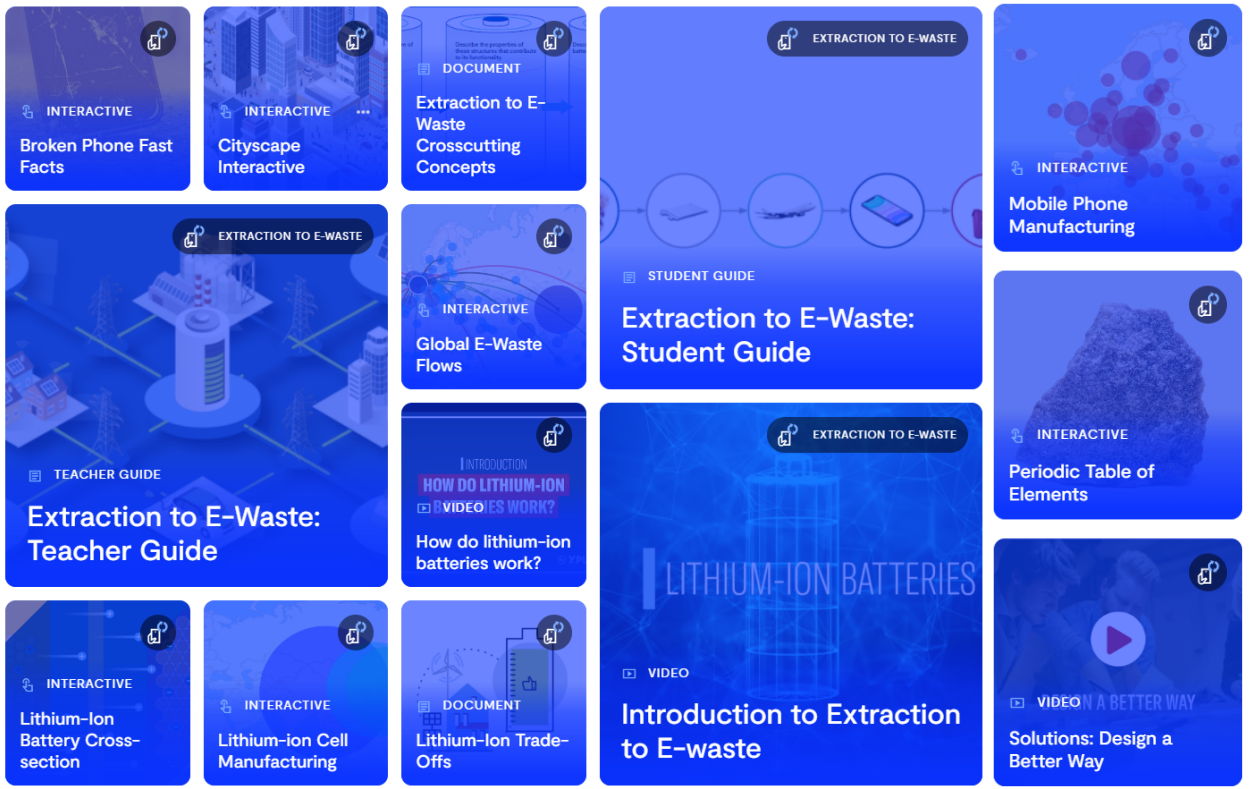


Students tend to be more motivated when they feel that work truly belongs to them, and I just had to give them time and permission to explore and discover their own journeys.

By becoming a fellow researcher in the room, as opposed to their official classroom teacher, I was able to observe and encourage creative, authentic thinking and problem-solving.

The high schoolers took very different approaches during their research, which may not have happened if I had prescribed a certain way of working. Even better, one student was so invested in her research on copper mining that her work has continued outside of the project, with my support. Using her new knowledge, this student presented with me at an education conference, and, as an active environmentalist, she sees that her voice matters.

The 7th and 8th graders explored the issue of e-waste by learning about lithium-ion batteries, particularly the trade-offs to support sustainable cities while considering safety and environmental concerns. They were able to research a particular aspect of the "life" of a smartphone, delivering their creative presentations to the class. Some students created short plays to highlight different perspectives and competing interests for raw materials and the need for smartphones. The students were left so curious about their school community's knowledge of e-waste that they created a schoolwide survey to capture data for further work to address the issue of e-waste in the community. I can't wait to work with these students again!



The Resource Library for the Extraction to E-Waste Xplorlabs pathway.

Reflecting on the learning experiences

Many teachers are limited by time and resources, so we have to be pragmatic about the materials we use to get the big picture across to our students. What can help are freely available, high-quality resources, such as those found on Xplorlabs.org. The pathways can be adopted in classes, as is, or dipped into as mini sessions for active learning.

The learning experiences worked because the students completed their projects with evidence that they had learned, and with the enthusiasm to present what they knew to others. The projects worked because I communicated the intended schedule to the teachers in the room, to the leadership team, and to the students. The messy productivity worked because it was built into the timing of the projects, and because this is essential for action-oriented learning to matter to the students. The projects to create are endless, for the benefit of our students. ■

Structure & Spark: Engineering for Fire Safety

By Justin Guida

K-8th Grade STEM Teacher,
Science Lead, Gifted Liaison,
STEM Clubs Coordinator

Philadelphia, Pennsylvania

Fire safety science instruction and engineering in the middle school classroom

Imagine creating a learning experience that your students will not just remember fondly, but talk about for years to come. This is the sweet spot of education: meeting rigorous standards while diving deep into their real-world applications.

Being a part of the Xplorlabs Educator Fellowship challenged me to combine Xplorlabs' resources with my own teacher-designed extension. This series of lessons was as invigorating to design and facilitate as it was memorable for the students to experience. Instead of grappling with district-provided, often contrived curriculum scenarios, we focused on the destructive power of fire and its deeply personal relevance. We provided students with a safe space to investigate the science of how fire ignites and behaves.

Additionally, rather than merely memorizing facts, our students became fire investigators solving a fire mystery through knowledge gained from hands-on investigations. We then took it a step further, challenging them to apply their findings and independent research to create a model of a fire-safe house. This process allowed them to reevaluate their own behaviors organically, and more importantly, it empowered them to be problem-solvers in a world where they may feel they lack agency.

Fire in the classroom is a transformative learning experience

Using Xplorlabs led to some of the most memorable experiences of my career. During our surface ratio experiments, we had a learning moment involving a little too much smoke from a dense wood block. One teacher didn't realize we were conducting fire science experiments and pulled the fire alarm when they smelled something burning! I was a little embarrassed by this, but I was also proud to see how quickly my colleagues would respond in the face of a threat (even if it wasn't real). It was a great conversation between my students and I about escape planning, but next time I made sure everyone was aware it was fire science day.

Beyond the excitement, what was truly transformative was how my students began to look forward to class every day.

There is an inherent taboo to studying fire, as it's something they have been told not to touch their whole lives. By engaging with it safely and scientifically, their mindset shifted to understanding.

This understanding was most evident when they learned about how closing doors at night slows the spread of flames and helps increase escape time in the case of a fire. After learning about the role of ventilation, one student shared that they couldn't believe they'd been sleeping with their bedroom door open. The next day, that same student shared that they had informed their family about what they had learned, and now they all shut their bedroom doors at night. A hum of agreement followed from the class. Another student suggested that houses should have automatic vent-closers alongside sprinklers. This new, critical way of thinking was reflected in their final models, where students focused intently on the placement of doors, vents, and windows.

Xplorlabs didn't just teach them science; it taught them how to stay safe.

Science, research, planning, building, presenting … oh my!

Having high-quality resources in the classroom is a win, but having vetted, “plug and play” lessons is a godsend for any busy educator. The best part of Xplorlabs is the flexibility — I could use the lessons as written to build foundational knowledge, then expand them to suit my specific standards and student interests.

Through interest inventories, I knew my students wanted an engineering design challenge. Through my own reflection, I wanted them to practice claims, evidence, and reasoning while creating more space for student voices. While speaking and presenting can often be a struggle in middle school, this resource made it seamless. I combined Xplorlabs with an engineering project, creating an environment where students could discuss science openly.

The final presentations didn’t feel like pulling teeth — the students genuinely wanted to explain their model homes to one another. I was able to deliver a truly memorable learning experience, specifically tailored to my students’ needs, all built on the superior foundation provided by Xplorlabs. ■

Students working together to create model homes with a focus on fire safety elements.

My Experience With the Xplorlabs Educator Fellowship From A to Z

By Elliot Hall
6th Grade Science Teacher
Glendale, Arizona

As an Xplorlabs Educator Fellow, I worked to fit the different Xplorlabs pathways into my 6th grade curriculum throughout the school year. We went over The Science of Extraction to E-Waste pathway at the end of the first quarter since it tied nicely into content around ecosystems and habitat destruction caused by humans.

In February, we took a slight break from the quarter's official curriculum to go over two pathways, the first being The Science of Fire Safety. During this pathway, students learned about fire sprinklers and how they work to keep homes and businesses fire safe. Information that really stood out to the students included the amount of time you have to escape your house during a fire, why house fires are burning faster than ever, and what their families could do to increase their chances of survival if they experienced a house fire.

The second pathway of the quarter was The Science of Thermal Runaway. Students learned about lithium-ion batteries, the devices that require them, what can cause thermal runaway, and what happens when a device overheats in this way. Students were very interested in how their current treatment or usage of lithium-ion battery devices could impact the possibility of thermal runaway.

Once students had gone through three out of the four pathways, it was time to move toward agentic action. Students brainstormed how they could share what they learned with their community. We collected the results of this brainstorm in a choiceboard composed of ideas from all three classes. Students then formed groups and chose one of the options from the choiceboard to pursue.

Many students really liked the idea of teaching younger grade levels about what they learned. We ended up having a group present to every classroom from kindergarten through 4th grade on one related topic or another.

Other groups chose to make posters to place around campus or in their neighborhoods, as well as flyers to post on our school's social media account to raise awareness about fire safety and thermal runaway. Every group was engaged and produced something that could be used for their desired outcome.

After all the presentations and materials were displayed, students took part in a gradewide Padlet, which is an interactive bulletin board, to share what advice they would give to new 6th grade students the following year as they went about completing the same project. This was designed to help the students leave a small legacy behind for the next school year to follow.

We are now in the fourth quarter of the 2025-26 school year and embarking on the final Xplorlabs pathway: The Science of Fire Forensics.

Agentic action brainstorming choiceboard.

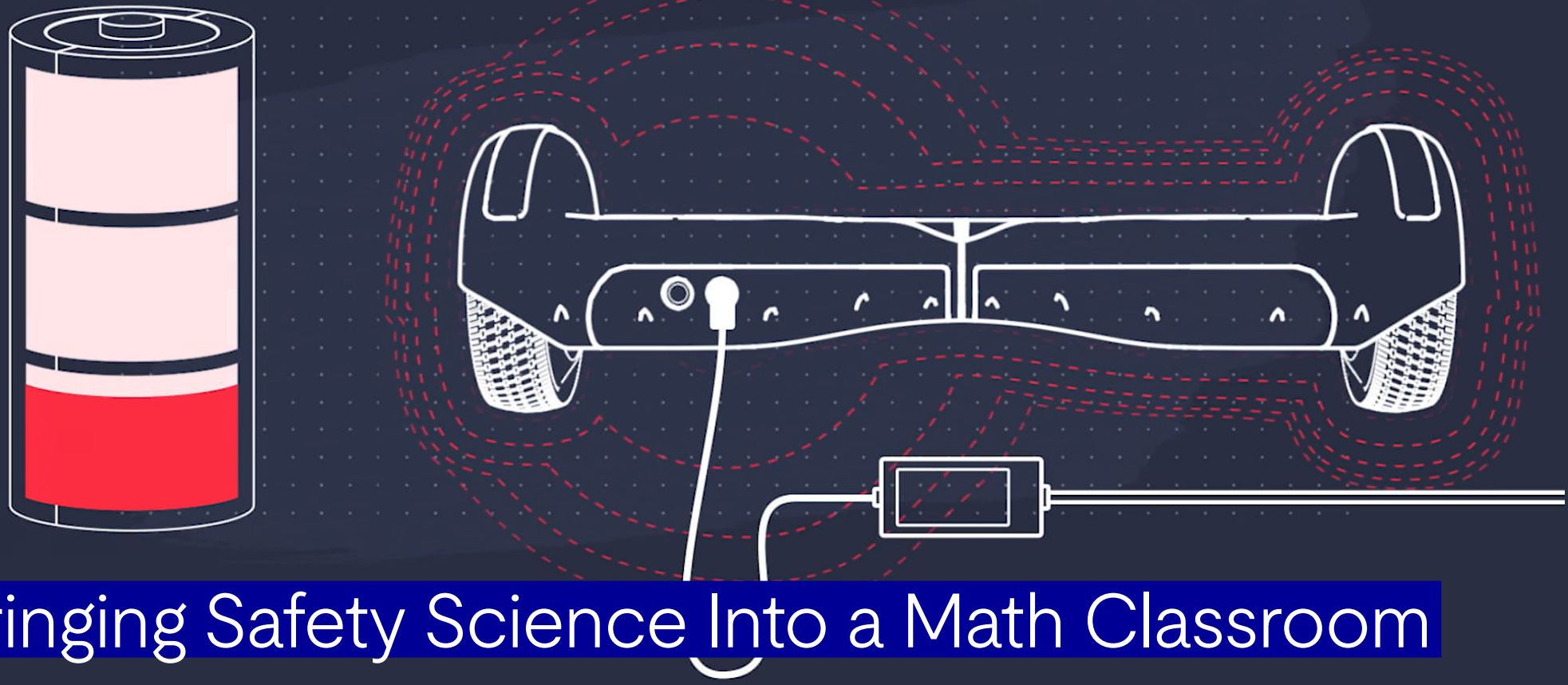
Importance of fire safety Items	Talk about 3 mins to escape home in a fire	Talk to parents about fire escape plan	Educate others on creating a plan for escaping fires	Make a fire safety ad	Educate others on cleaning their rooms due to fire safety	xplorlabs.org	
Look for and educate others on fireproof materials	Educate about checking smoke detectors	Create a house layout with locations for smoke detectors	Practice fire drills	Social Media Post to spread awareness of Fire Safety	Fireproof Materials	Using appropriate chargers - educate on Lithium batteries	Battery full = no longer charging / unless overcharge
Explain clutter and fire relationships	Educate on tools for escaping fires	Classroom fliers on fire safety or teach classes	School posters on Lithium-ion rules	Social media post about Lithium-ion battery care	Cellphones/Batteries Video Educational	Create survey for families on the number of smoke alarms in the home and how many are working.	Making a model of a room to determine fire prevention
Educate on fire sprinklers	Talk to kids about fire safety	Fliers or poster on proper or safety when charging Motor bikes?	Making sure electronics hot - Appropriate chargers	Do not use while charging?	Fire safety : Close doors when sleeping	sharing with the community what youve learned about fire safety	Make fire safety Posters

Students are really enjoying learning about the fire investigation process and at the end of this pathway, they will design a poster to print and display for all families during our science night in May.

This year has been one of the most trying years in my career as an educator. The number of students uninterested in engaging in hands-on work was at an all time high. However, it was like night and day when those same students began engaging with the Xplorlabs pathways, planning for and taking agentic action. At that point, they were all driving their own learning and community outcomes.

I implore you to try to give your students the chance to engage in agentic action. See for yourself the impact and change that co-planning and taking action can have on students!

By Candice Holland Morris
7th Grade Math Teacher
Phoenix, Arizona



Bringing Safety Science Into a Math Classroom

My unique Xplorlabs experience

Three words to describe my Xplorlabs Educator Fellowship experience: insightful, interesting, and important.

This experience helped me realize how critical safety science is, especially when it comes to e-waste and battery disposal. Before this fellowship, I did not think much about where batteries go after they are thrown away or whether I was disposing of them correctly. Learning about these issues made me more aware of my responsibility as both an educator and a member of my community.

As a math teacher, I had to think differently about how to bring safety science into my classroom. At first, I was unsure how it would fit into my content. Over time, I realized that real-world problems, data analysis, and student-led projects naturally connect to math.

This fellowship pushed me to be more creative and showed me that meaningful learning does not have to stay within the boundaries of one subject.

An unforgettable fellowship experience

One of the most unforgettable parts of this fellowship was traveling to Philadelphia to learn about the safety science addressed in the Xplorlabs pathways. In just three days, I learned so much through hands-on investigations and collaboration with other educators. Being a learner again reminded me how powerful it is to experience content in an active way instead of just hearing about it.

That experience stayed with me when I returned to my classroom. I wanted my students to have that same level of engagement and curiosity. They participated in several experiments, including the bologna test and a fire escape simulation, during which we tracked their escape times using charts and data. These activities allowed students to connect safety science to math concepts, such as percentages, percent change, unit rate, and data analysis in a way that felt real and relevant.

Additionally, hands-on learning made a difference. Students were not just completing an assignment: they were asking questions, making observations, and talking through what they noticed.

Another moment that stood out was leveraging Nearpod to facilitate an Xplorlabs experience where students engaged in interactive simulations and videos from Xplorlabs.org, and answered embedded questions that guided them through real-world battery safety scenarios. Nearpod allowed me to present information in a structured, engaging way while also checking for understanding in real time through polls, open-ended responses, and guided questions. Students were genuinely surprised by the risks of improperly handling lithium-ion batteries and immediately started asking questions about how batteries should be properly handled and disposed of. They saw pictures and watched videos about what would happen when batteries are crushed, overheated, or dropped. That moment showed me that this learning was sticking with them.

My outlook on safety science

This past year, I was introduced to safety science. I realized that I am not the only educator who was unfamiliar with this concept. Safety science is not something that is widely discussed, which means many students and adults are unaware of the risks and responsibilities connected to everyday items like batteries and electronics.

Through this fellowship, I became more comfortable teaching content that was new to me.

I learned that it is OK to discover new things alongside my students. In fact, based on my experience from this year, that process helps build stronger conversations in the classroom because we are exploring the topic together.

When my students learned about battery and electronic disposal, the most common response was that they had no idea batteries needed to be disposed of in a specific way. Many admitted that they usually throw used batteries and old electronics in the trash without thinking twice. Once they understood the dangers of improper disposal, the conversation shifted from surprise to action.

After completing the bologna test, I explained to my students that I had to pay to properly dispose of the button batteries we used during the experiment. That detail stood out to them. It made the issue feel real and immediate. From there, we began discussing ways to bring awareness to other students, families, and members of the community.

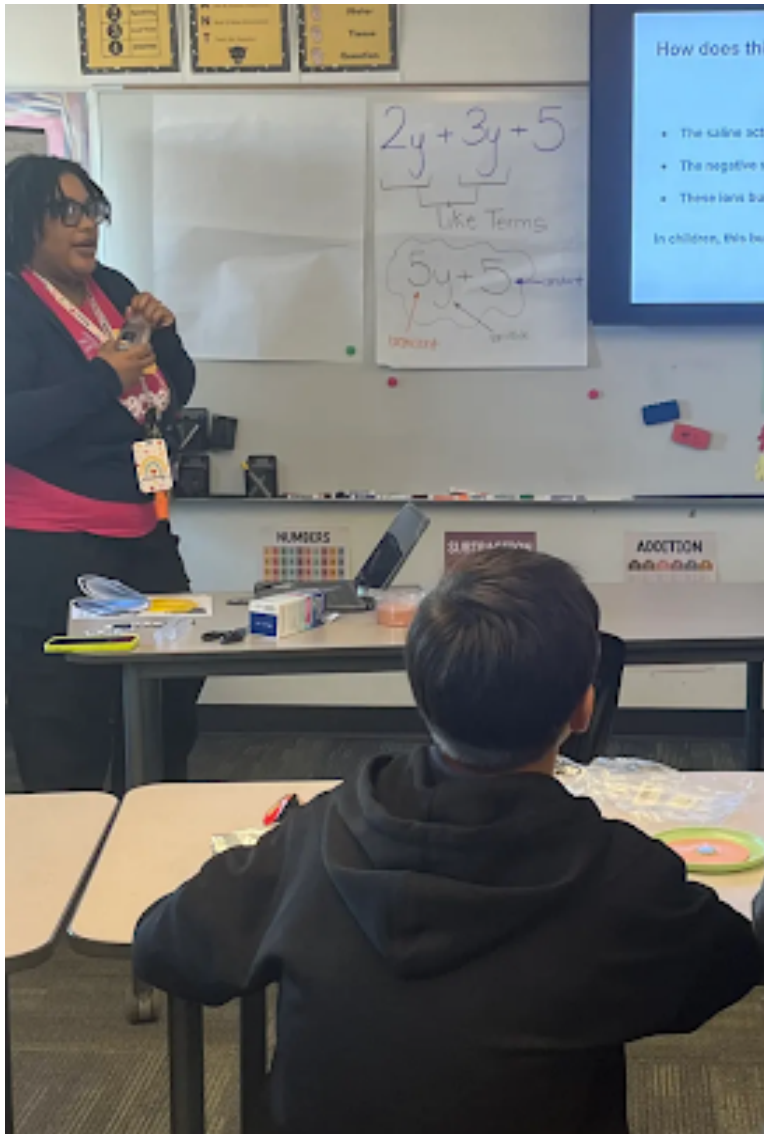
From learning to action

As a group, we have decided to plan a battery drive during the 2026 holiday season, when many families replace toys, electronics, and batteries. Students are owning the project and leading the effort to research proper battery disposal and identify locations in our city where batteries can be safely dropped off. They are also brainstorming how to communicate this information to others in a clear and engaging way.

Connecting the project to a real-world moment helped students see how their learning can directly impact their community. They will plan on leading this drive when they are in 8th grade next year.

This process has been meaningful because students are not only learning about safety science, but they are also applying their knowledge in a way that creates change. They are beginning to see themselves as people who can take action and make a difference.

Bring real-world learning into your classroom. I encourage educators to explore Xplorlabs and think about how safety science can fit into their own classrooms, even if they do not teach science. You do not need to have all the answers to get started. Begin with one lesson, one activity, or one conversation. ■



Students completing the Xplorlabs Bologna Test and discussing what they notice.

Solving Real-World Problems Using Iterative Design Thinking Strategies

By Luisa Levine
7th-12th Grade STEAM Teacher
Philadelphia, Pennsylvania

The Xplorlabs Science of Thermal Runaway and Science of Extraction to E-Waste pathways guided my high school engineering class to become experts on lithium-ion batteries. Using iterative design thinking strategies, students built on extensive research to design and prototype ultra-specific solutions to real-world problems.

Our class began the unit by identifying items using lithium-ion batteries that we interact with every day. From both the thermal runaway and extraction to e-waste pathways, we learned about the chemical science of batteries, understanding why their technology is both beneficial and potentially dangerous. Using independent readings and videos interspersed with hands-on activities and investigations augmented from Xplorlabs content, students researched thermal runaway and the extraction to e-waste cycle for two months.

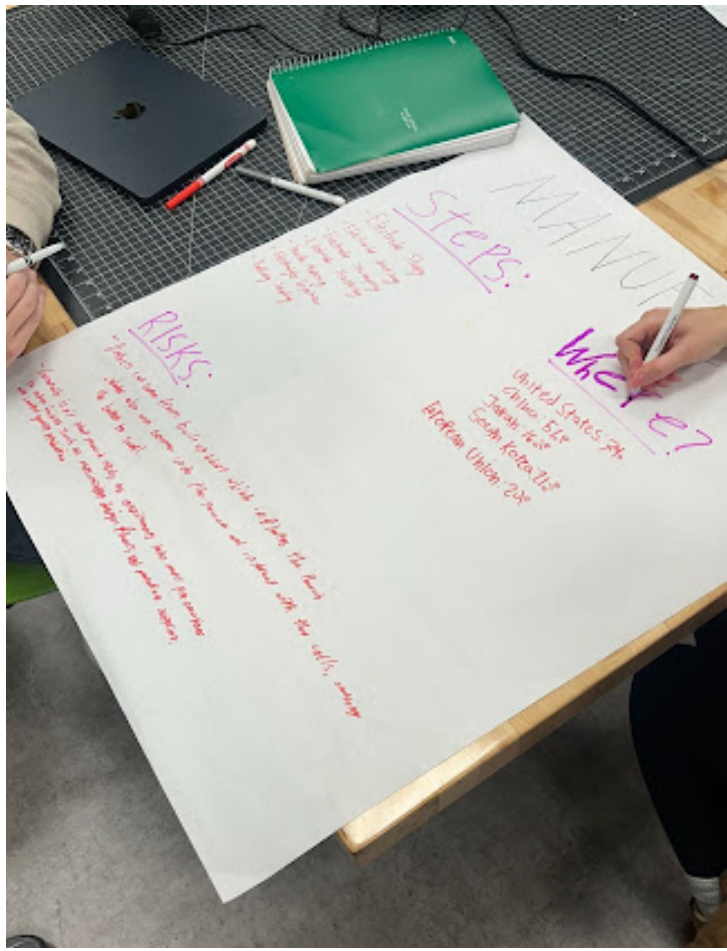
We often used a "jigsaw" method, which meant I split sources between small groups and they presented their findings to one another through posters and digital infographics. Students gained expertise on specific topics and were accountable for each other; our engineering classroom became a place to build collective knowledge. At the end of our initial research time, we compiled everything we knew about lithium-ion batteries — the good, the bad, and the ugly — and we organized a list of their benefits and trade-offs. This was the initial research phase of the design thinking process. Next, was ideation.

I tasked students with generating two radical project ideas each that solved for a real problem related to lithium-ion batteries. Their potential solution could not use magic, but everything else was fair game. Part of the students' challenge was to take on problems while still leveraging the advantages of lithium-ion batteries that make them so useful. I encouraged them to think big and not judge their ideas yet. In groups of four, they shared their solutions — some silly, some impossible, others authentic — and shared thoughtful and constructive feedback using a timed evaluation protocol.

They incorporated each other's feedback and revised their solutions to meet the following criteria:

1. Is it sustainable? Is your idea efficient and reliant on self-propelling systems?
2. Is it scalable? Will this work in our school? Our neighborhood? Our city? Our country? The world?
3. Is it innovative? Is this a new idea that does not yet exist?
4. Is it possible? We have a couple of months to work on this with limited resources — what can we realistically accomplish in class?

Groups presented informative posters of one or two of their favorite ideas to the whole class, and at that point the students became fully autonomous. They each decided which group to join based on their skills and interests, and got to work designing and prototyping their proposed object or system.



Their proposals were ambitious. The solutions that involved a water cooling system, for example, would be impossible to fully prototype without building a pump. The project that involved capturing the energy released in an intentional thermal runaway cycle would require an enormous lab, years of experimentation, and probably a graduate-level understanding of thermodynamics. The students who wanted to revise city legislation surrounding e-waste recycling had never read a legal document, let alone written a law. These were great, moonshot ideas to solve real problems, owned by students — this mattered!

So we started small, and worked our way out. After more research, students pinpointed precise aspects of their problem and designed tests that generated data they could analyze.

While I was invested in the success of their final products, I learned that the significance of the project was students meeting new, real-world challenges, managing time and tasks among themselves, and modifying their goals as they learned new information.

One team worked in subgroups to design the best tests for their e-bike battery enclosure and decide if their data was significant or if they should move in another direction. Other students interviewed an EPA attorney to get suggestions for how to tackle environmental law. Another group learned how to 3D model and print different shapes to test their strength under pressure. I loved seeing the possibility space of their project adapt as they learned, and how independent they were becoming.

The best part about this project was the students' agency.

They had learned enough from the Xplorlabs resources to become knowledgeable experts on the subject of lithium-ion batteries — probably, I reminded them, more knowledgeable than anyone in the building and beyond. I held them to the expectation that this product or system would really go to market, and they needed a good deal of empirical evidence to back up their claims. Not only did they design their products, experiments, and data-driven presentations, but they also collaborated with me on their own grading rubrics as their projects grew and changed. Their feedback to one another at the end of the project was rich, complex, and thoughtful, and showed that they were thinking critically and seriously about each other's ideas.

Xplorlabs' resources gave my students the tools they needed to develop a depth of knowledge about a subject, and they developed the skills to make a difference.

I facilitated their thinking and discussions, but ultimately, I had no preconceived notions of their outcomes and every project surprised me. My trust in the students allowed them to become independent and responsible for their work, and they were compelled to think critically at every step of the process. ■

Stretching Beyond the Comfort Zone: Rethinking What Science Class Can Be

By Madison O'Neal

High School Science Teacher

Phoenix, Arizona

When teaching outside the box feels uncomfortable, but necessary

There's a moment every educator recognizes: that hesitation before trying something new. The lesson that doesn't quite fit, the activity that feels harder to justify on paper, or the approach that strays from what they've always done. With the Xplorlabs Educator Fellowship, I've found myself in that space more often than I expected — uncertain, stretched, and honestly, a little uncomfortable. And that's exactly where the growth has happened.

As a high school science teacher, I'm used to tightly aligning lessons to standards, pacing guides, and tested content. My instinct is to ask, "How does this fit into my curriculum?" But the fellowship experience has pushed me to ask a different question: "How can this expand what my students believe science can be?"

By stepping outside of my comfort zone, I started to see my curriculum as more flexible and more connected to the real world. Science stopped being just a set of topics to cover and became a way for students to make sense of the things they experience every day.

It also forced me to let go of the idea that every moment in my classroom needs to be perfectly structured or neatly aligned. Some of the most meaningful learning has come from moments that were messy, unexpected, and driven by student curiosity rather than my lesson plan.

What happens when curiosity takes the lead

Some of the most powerful outcomes from this experience haven't come from carefully designed lessons — they've come from moments I didn't plan at all.

I've had students stop me mid-class to talk about batteries, why rechargeable devices sometimes overheat, why phones or vapes can explode, why something left charging overnight might leave scorch marks on their bedsheets — all thanks to their experiences with Xplorlabs. These weren't part of my curriculum for the day. But they were real, immediate, and rooted in genuine curiosity. And instead of redirecting back to the planned content, I leaned into those conversations.

Those moments became opportunities to explore energy transfer, chemical reactions, and real-world applications of the concepts we're learning. But more importantly, they showed me something bigger: Students want to understand the world around them — they just need the space to ask.

I've also noticed a shift in the types of questions my students are asking. They're not just looking for the right answer anymore. They're wondering. They're making connections. They're asking questions about both the exciting topics and the ones that might normally feel mundane.

And maybe the most meaningful change? I'm starting to see that spark.

The same freshmen and sophomores in my honors biology class — the ones who sometimes meet new content with sighs or eye rolls — are leaning in just a little more. They're engaging in ways that feel more authentic. They're curious thanks to the Xplorlabs Extraction to E-Waste pathway.

It's not every student, and it's not every day. But it's enough to remind me that when we shift how we approach learning, students respond.

The role of collaboration in pushing your thinking

Another key part of this fellowship experience has been collaboration with other educators. Being surrounded by teachers who are willing to take risks, share ideas, and rethink their practices has been both inspiring and challenging.

It's easy to get comfortable in your own classroom, doing what works. But hearing how others approach similar challenges pushed me to reconsider my own assumptions about teaching and learning.

One idea that has stayed with me is the importance of creating space for students to notice and wonder. It's such a simple shift, but it changes the dynamic of the classroom.

Instead of positioning myself as the primary source of knowledge, I'm inviting students into the process of discovery.

That shift doesn't mean giving up structure or rigor. It means making room for students to think more deeply and take ownership of their learning.

Ultimately, this experience has pushed me to think beyond content coverage and consider the bigger purpose of science education.

When students are given opportunities to explore real-world problems, ask their own questions, and connect their learning to their lives, they begin to see themselves differently. They start to recognize that they can make sense of complex ideas. They can ask meaningful questions. They can contribute. They begin to see where they fit.

That's the kind of learning that lasts beyond a unit, beyond a test, and beyond a single class.

And it doesn't come from staying within the traditional mold of teaching. Because when we stretch ourselves as educators, we create opportunities for our students to do the same.

This reflection is part of my ongoing journey through the fellowship, one that continues to challenge me to think bigger, take risks, and reimagine what science education can look like for my students. ■

Student modeling mining impacts on communities with a cookie mining activity.

Bridging STEM, Safety, and Empathy Prototyping with Wearable Technologies and Xplorlabs Resources

By Maggie Pollard

7th-12th Grade FirstHand Program Facilitator

Philadelphia, Pennsylvania

Hands-on STEM learning for Philadelphia middle and high schoolers

I am a program facilitator at FirstHand, an out-of-school STEM program based in West Philadelphia, providing hands-on STEM learning experiences and career exposure to students in 7th-12th grades. As a program facilitator, I am responsible for facilitating 10-week classes, engaging students with mentors, and writing/rewriting curricula.

We offer a class called “Future Techstyles” to a group of students from Girard College that feels uniquely ours, and it was a great opportunity to supplement the curriculum with activities from Xplorlabs. In the course, students learn block coding with micro:bit, a pocket-sized computer designed for students to learn coding and sewing techniques, and then they create a prototype of a wearable technology. It can be anything that matters to the students as long as it incorporates the micro:bit, block coding, and sewing. The students brainstorm their ideas by creating a heartbreak map where they write the things they love on one side and things that upset them on the other. They then come up with a prototype idea that bridges what they care about with a problem they want to solve in order to prototype with empathy.

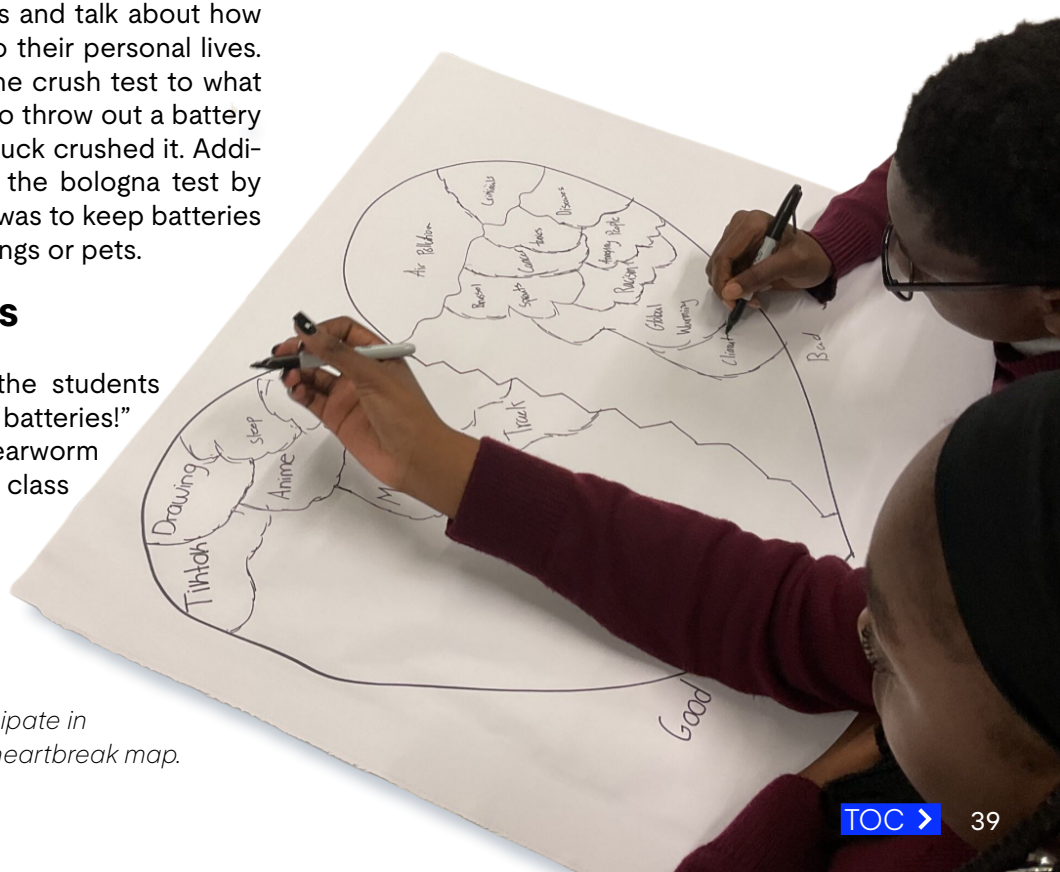
Xplorlabs resources used to supplement learning

This semester, we used the Xplorlabs crush test and bologna test to teach students the importance of battery safety and proper disposal since the micro:bits in their wearable technologies are battery operated. Many of the students had no idea the danger lithium coin batteries could present if accidentally consumed or how lithium-ion batteries needed to be handled and disposed of. It was amazing to see them light up during the different activities and talk about how their learnings connected to their personal lives. Many of them connected the crush test to what would happen if they were to throw out a battery in the trash and a garbage truck crushed it. Additionally, they connected to the bologna test by discussing how important it was to keep batteries out of reach of younger siblings or pets.

Student takeaways

Throughout the semester, the students got the phrase “recycle your batteries!” stuck in their head like an earworm and would say it throughout class and their presentations.

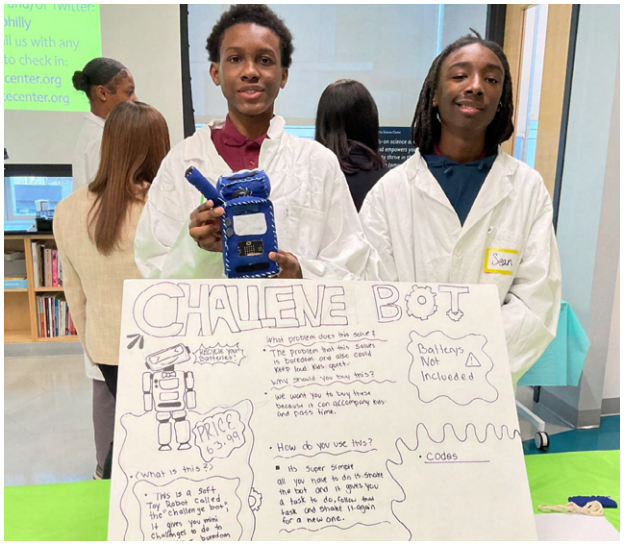
I loved how teaching them about the safety science behind their wearable technologies made them that much more invested in their prototypes and presentations.

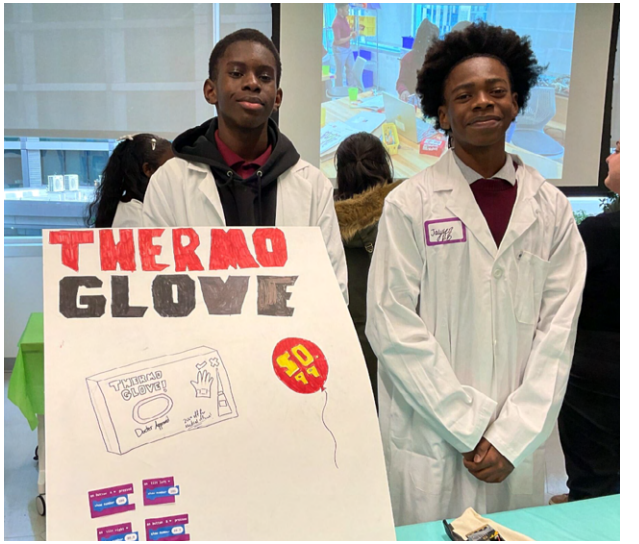


Girard College students participate in empathy prototyping, using a heartbreak map.

For their final showcase, they were tasked with creating a wearable technology prototype and had to create a poster and sales pitch to go along with it. Visitors at the final showcase acted as investors and would listen to each of their sales pitches before voting on categories like best prototype, most creative, best presentation, etc.

Students also had to talk about the importance of battery safety and how to recycle their wearable technology prototype during their sales pitch, providing their investors with local initiatives to recycle the batteries. Supplementing this course and its final showcase with Xplorlabs resources was very seamless and only motivated them more. ■





Top: Girard College student presentations at the Future Techstyles Final Showcase.
Bottom: Girard College students completing the Xplorlabs Bologna Test.

By M. Ramos
6th-12th Grade STEM Teacher
Albuquerque, New Mexico

From Fire Forensics to Community Action

How fire forensics sparked student-led learning

When I first introduced the Xplorlabs Science of Fire Forensics learning pathway to my middle school students, I expected curiosity. What I did not expect was a movement.

From the very beginning, students took ownership of their learning experience this school year. They decided they didn't want to simply learn about fire science — they wanted to become certified fire safety cadets. To pursue this goal, we contacted our local fire station and the captain came to our campus to guide students through the certification process. All 30 students in the group successfully completed the training.

At the start of the program, many of the students were hesitant to collaborate. They preferred working independently and often wanted to keep their ideas to themselves. But as they began exploring the science of fire, the fire triangle, and the elements necessary for ignition and combustion, they quickly realized that they would need each other's thinking to test their theories. They experimented with materials found around the school and later brought materials from home to investigate if fire behaved the same way with everything. Their investigations transformed abstract science concepts into hands-on, real-world problem-solving.

Building and burning model homes to test fire safety

After learning how fires start and spread, students began asking: Are our homes actually safe? That question launched one of the most powerful projects I have ever witnessed.

Students initially planned to 3D print model homes and cover them with common household materials. But one student pointed out that most of their homes were built with wood. That observation changed everything. Instead of plastic models, they constructed miniature wooden houses, layering them with plaster and drywall to replicate real construction. We even had some of their parents come in and talk about how homes are built from beginning to end.

These students studied blueprints, called HOAs and builders for material lists, and compared how older homes differed from newer builds. Soon, the models became highly detailed. Students recreated bedrooms with fabric scraps for bedding and even made sure the rooms look like the "mess" that they actually have at home. The students added miniature furniture and carefully mirrored the layout of their own homes (minus electrical wiring for safety). These were not simple models, but scaled representations of their lives. Then came the test.

Students burned one model home to observe how the fire behaved. They documented how the roof ignited first and how the flames traveled.

One student noticed something critical: smoke rises and detectors are mounted on the ceiling. This sent us into a rich discussion about engineering design. We discussed the science behind placement and potential pitfalls of smoke alarm design (like false alarms). What started as an observation became engineering design thinking in action — much like safety scientists in the field, we imagined designs of the future such as solar-powered smoke alarms and fire-resistant wiring.

Extending fire safety to the Albuquerque Bosque

The project didn't stop at their homes. Living in Albuquerque, our students are deeply aware of the dryness of our summers and the vulnerability of the Bosque, the wooded area that runs alongside the Rio Grande. A student asked, "If we can redesign smoke detectors for our homes, why can't we design something for the Bosque?"

That question led to outreach. We contacted Bosque School to explore how students could analyze fire risks in wooded areas near the Rio Grande. They discussed how the river runs through the property but is dry during parts of the year, increasing fire danger. Another group built upon the solar sensor concept and proposed placing fire detection devices in remote areas. These sensors would emit sound alerts or transmit data to notify communities before fire spread across acres of land.

At this point, students were applying fire science to protect their city. The students placed the fire sensors in the wooded area and now check them every two weeks to make sure they are working properly. The goal is if there ever is a fire, the fire detectors will emit sound and alert anyone nearby. Students have also begun to develop an app for remote detection and faster alerts.

Becoming open-minded problem-solvers

As we reflected on the fire forensics unit, students shared something that surprised me. They said the experience had made them more open-minded. They realized there isn't just one "right" way to build a house or design a safety system. Different builders use different materials. Older homes follow different codes than newer ones. Every solution has trade-offs.

Through collaboration, they learned to listen carefully to one another.

Ideas improved when challenged, designs strengthened when debated, students who once avoided group work began relying on each other's strengths.

The science content was powerful but the shift in mindset was transformative. They began to see that protecting a community requires openness, creativity, and shared responsibility. Fire safety became more than a topic — it became a lens for civic engagement.

Why hands-on STEM and real-world partnerships matter

This fellowship reminded me that students rise to the occasion when they are given authentic problems and trusted with meaningful responsibility.

- They contacted experts.
- They analyzed real construction materials.
- They engineered prototypes.
- They connected classroom learning to their own homes and environment.

Most importantly, they cared!

By allowing students to guide their learning, the fire forensics experience became more rigorous and more personal than any scripted curriculum could have achieved.

Fire science was a starting point for us. Community protection, innovation, and open-minded collaboration became the outcome.

Trust your student with real problems. You might just ignite something powerful. ■

Fire Safety in Culinary Arts

By Catherine Robinson

6th-8th Grade Culinary Arts Teacher

Flagstaff, Arizona

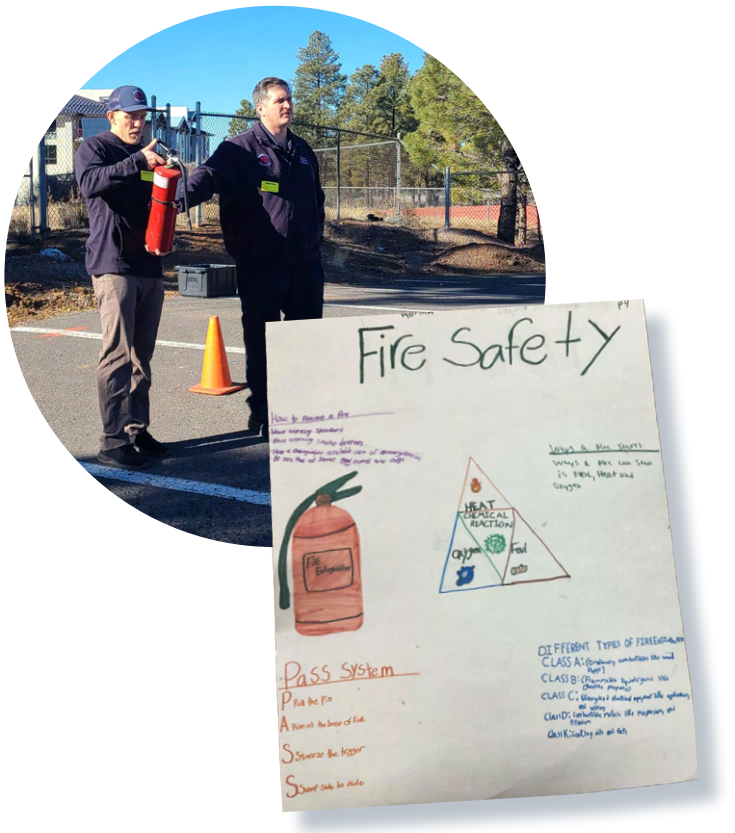
The fire safety unit for my culinary arts students began like any other. My students and I began with a general lecture about all of the accidents and injuries that can happen in a kitchen and what can be done to prevent them, as well as what to do if they happen. Students learned about grease fires and ways to put them out, such as with a handful of flour or smothering the fire with a lid. Students learned that it's important to have a fire extinguisher in a kitchen, where fire extinguishers are in our own classroom, and how to use it.

However, as an Xplorlabs Educator Fellow for the 2025-26 school year, I had the opportunity to incorporate unique content and pedagogy into my culinary arts classroom — starting with a partnership with the local fire department!

The Flagstaff Fire Department came to Sinagua Middle School to further teach students about fire safety and how to use the extinguishers.

I decided to reach out to our local firefighters to see if they would want to partner with me and help teach culinary students about fire safety.

The firefighters reinforced what students already learned about fire safety as well as accidents and injuries. They discussed and explained the fire triangle, giving examples of kitchen fires and how the fire triangle can be helpful for determining how to put it out. They also brought expired fire extinguishers to campus and let all of our students practice using the PASS method.



Each student was able to hold a fire extinguisher, **P**ull the pin, **A**im at the base of the fire (which was represented by an orange cone in this case), **S**queeze the trigger, and **S**weep side to side.

As a class, we also went through The Science of Fire Safety learning pathway. We watched videos, learned about fire sprinklers, and engaged in the interactive experience. We also discussed having a fire escape plan at home and the importance of "Close Before You Doze," a campaign from ULRI's Fire Safety Research Institute to spread awareness of closing bedroom doors at night to stop the spread of flames. I emphasized how we practice fire drills all the time at the school, but that it's equally important to have a plan at home. I encouraged students to speak with their families about this key topic.

Students participated in a fire safety project to teach someone else about fire safety.

As the culminating assignments for the unit, students were told they needed to make a short presentation to teach someone about fire safety using the resources given in class, Xplorlabs, and their own research. They were allowed to make posters, slides, or videos. Many students went above and beyond and actually researched to teach me something! ■

Yes, Lithium-Ion Batteries Connect to Your Standards

By Danielle Shaw-Jones
High School BioSTEM Teacher
Jackson, Tennessee

Excited, energized, and confused

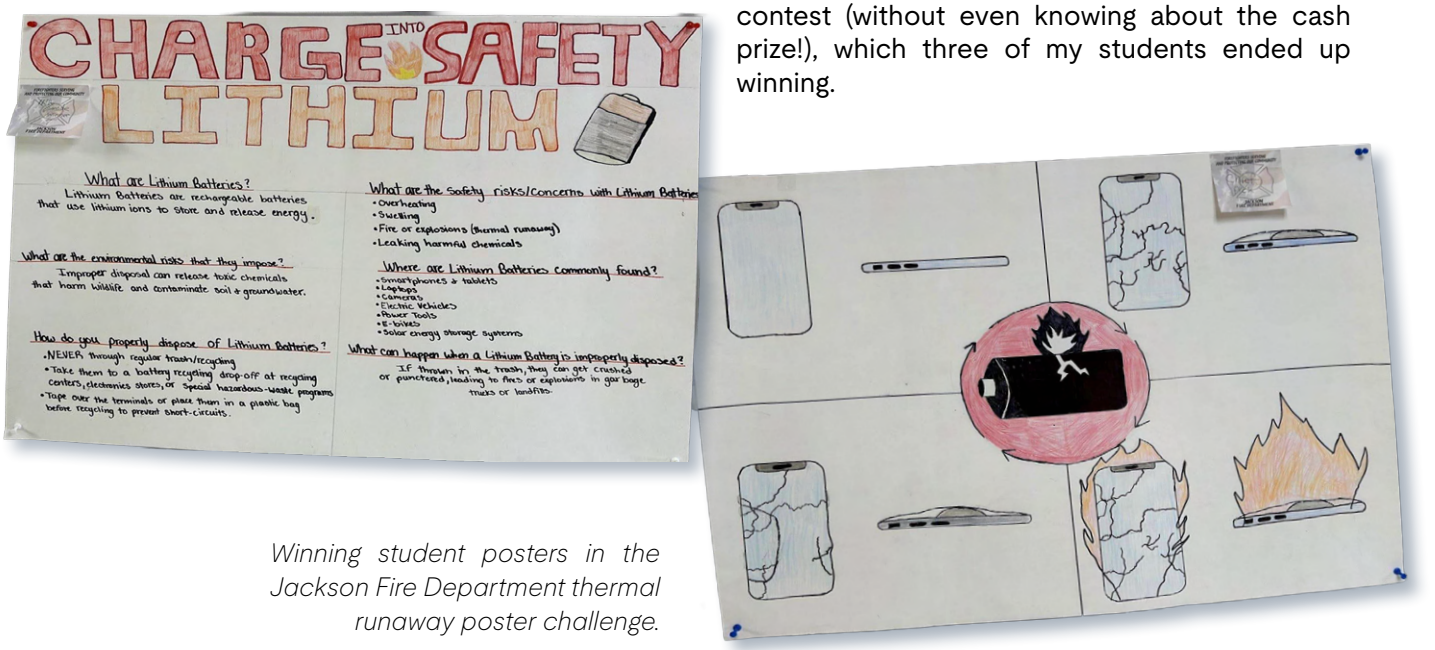
I must admit, I had a lot going on when I first became an Xplorlabs Educator Fellow. I purchased a house, moved my daughter to a new city, finished a summer internship, and got married. I had a lot going on in a span of one month! However, the experience at the Fellowship Summit was so exciting and fun, that I would not trade it for the world.

I loved how appreciated and acknowledged we felt for our work in education.

When I left the summit, I was energized, excited and felt like I wanted to take on the world. It wasn't until I got home that I realized I was so confused about exactly what I wanted to do. In the beginning, I thought I wanted my students – mostly seniors in high school – to tackle the challenge of managing heat produced by lithium-ion cells. My students wanted to do it as well; however, after a bit of research and practice, my students and I decided we didn't have the supplies, time, or interest. I then took on the task of trying to figure out how I could keep my students interested while working on the concept of lithium-ion battery safety.

Making the right connection (and a little gift card too!)

As a result of my experience working with the Philadelphia deputy fire chief at the Xplorlabs Fellowship Summit, I decided to reach out to our local fire stations. To my excitement, the local firefighters were interested in working with us on the exact topic we were researching — thermal runaway in lithium-ion batteries.



Winning student posters in the Jackson Fire Department thermal runaway poster challenge.

The local Jackson fire department hosted a poster challenge for students to build awareness of thermal runaway, a risk associated with improper lithium-ion battery charging, usage, and disposal. As a class, we took a field trip to the fire station to learn more about lithium-ion battery fires and actions to prevent them.

Students asked questions not only about lithium-ion battery safety, but also about items in their homes that could potentially cause fires. Many of my students became concerned about sleeping with their phones in bed, as well as leaving laptops and other items on chargers after they have been fully charged. I even learned a few lessons about my classroom practices. My students enjoyed the experience and got excited about the poster contest (without even knowing about the cash prize!), which three of my students ended up winning.

How does it impact us?

One of the most important things I want all my readers to know is that it is worth changing your perspective. I initially thought this would be a journey I was already familiar with as a science teacher. I have taught my students about energy conservation and how to make their homes energy conscious.

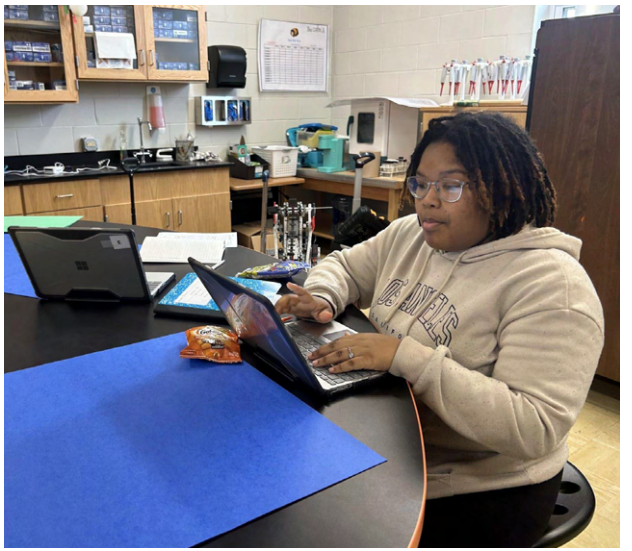
However, this entire experience has taught me so much more. For instance, as a result of working with the fellowship, I became aware of my own personal mistakes when it came to battery safety. In the classroom, I unplugged the rechargeable batteries we use for robotics competitions and explained to my robotics students about the risks of thermal runaway and proper battery care. The students in my class who were informed about thermal runaway were able to convince some of the more reluctant students by showing them models of lithium-ion batteries and thermal runaway.

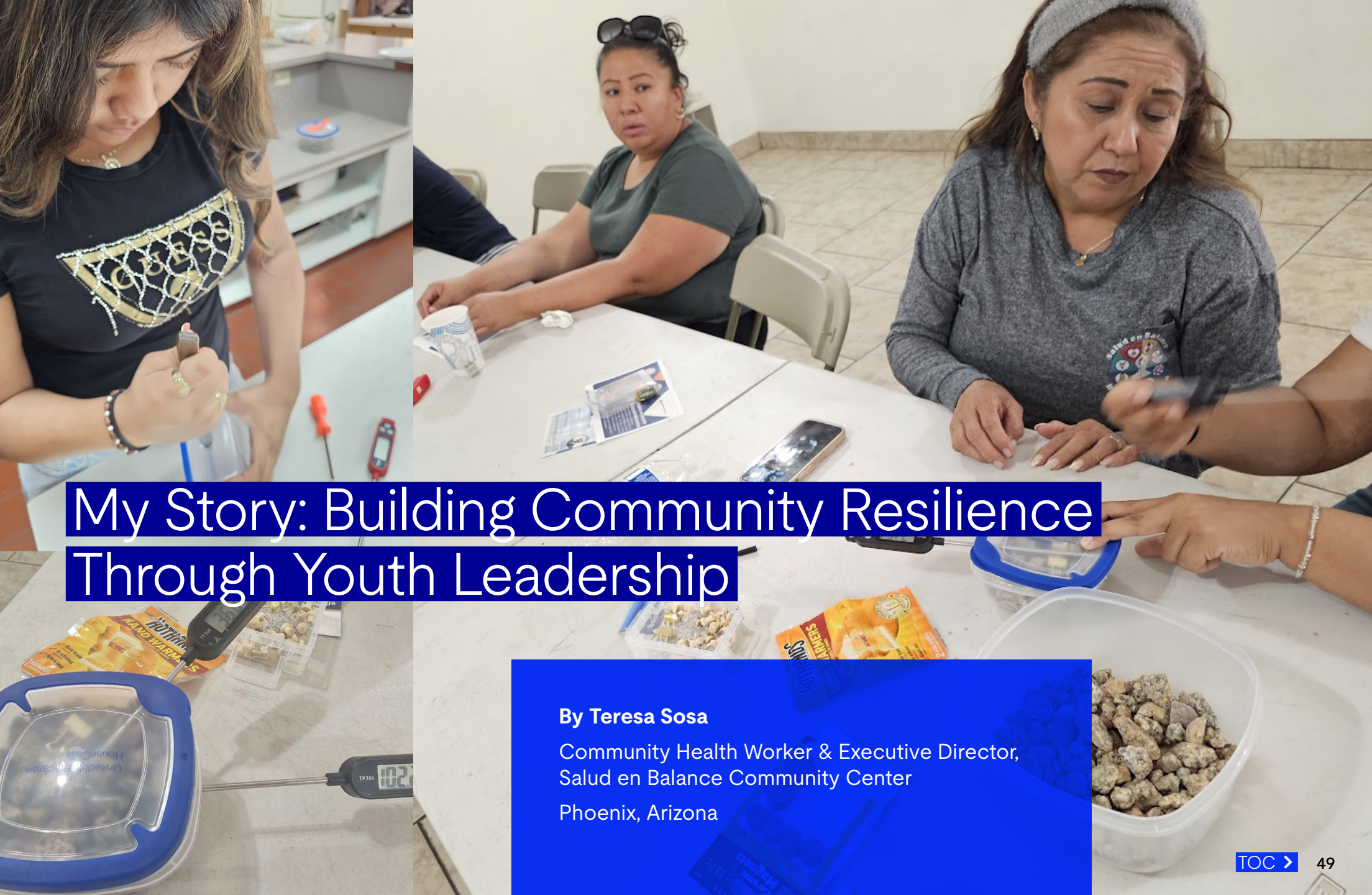
This gave me a feeling of excitement because my students were showing active learning and guided teaching. The experience also taught me to slow down and try to learn with my students.

Learning will cause changes, and that's OK

Students explained to teachers and school administrators how thermal runaway could occur. They even shared with local stakeholders. The stakeholders then shared with us about a project to help the school district save money. That's how we started our journey with the Energy Right School Uplift project.

Students, teachers, and the community are now collaborating with the local power company in a yearlong project to help save energy at our school, with the goal of cutting the energy bill by 25%. In the end, we will receive a $10,000 grant for our school as well as the chance to receive $200,000 in energy-saving school repairs if we save more money — and it all started with my students learning about lithium-ion batteries and thermal runaway. ■





My Story: Building Community Resilience Through Youth Leadership

By Teresa Sosa

Community Health Worker & Executive Director,
Salud en Balance Community Center

Phoenix, Arizona

Community members taking part in Xplorlabs' thermal runaway hands-on investigation.

Before I became an Xplorlabs Educator Fellow, I understood community challenges mostly from observation, not from action. I knew that many families and young people faced risks related to extreme heat, natural disasters, and limited access to health and educational resources, but I had never explored how to respond to those challenges in a structured and meaningful way. Through this fellowship, I had the opportunity to design and implement a youth-led community initiative focused on resilience, sustainability, and inclusion.

This experience transformed my understanding of how science, leadership, and community engagement can come together to create real-world impact.

My project focused on Xplorlabs' Science of Thermal Runaway and Science of Fire Safety pathways, with strong interdisciplinary connections to public health and civic engagement. I explored how safety issues such as thermal runaway and fire incidents can exacerbate environmental challenges.

To begin, I wanted to understand the specific needs of the community where I work. I designed bilingual pre-surveys to measure baseline knowledge, awareness, and confidence related to safety, sustainability, and community resources. The results revealed important gaps. Many youth and families had limited understanding of fire safety, emergency preparedness, and how to respond to extreme heat. There was also low awareness of environmental practices such as recycling and solar energy, or available community resources.

These findings guided the development of my program. I created structured activities, workshops, and discussions that focused on increasing knowledge, building confidence, and encouraging civic participation. I intentionally incorporated art and creative expression as tools for learning and emotional well-being, recognizing that engagement is stronger when people feel comfortable and connected. The program emphasized youth leadership, encouraging young participants not only to learn but also to see themselves as active contributors to their community.

After implementing the activities, I used post-surveys to measure changes in knowledge, behavior, and attitudes. The results showed clear and meaningful growth across multiple areas. In the cognitive domain, participants demonstrated increased understanding of safety procedures, environmental responsibility, and community systems. They reported greater confidence in recognizing risks and knowing how to respond to emergencies.

In the behavioral domain, participants expressed a stronger intention to adopt safer and more sustainable practices. Many reported that they were more likely to recycle, conserve energy, prepare emergency plans, and seek out community resources. There was also increased interest in participating in future community activities and youth-led initiatives, showing that engagement extended beyond the program itself.

Analyzing this evidence helped me understand something critical: Resilience is not just about knowledge.

While learning is important, it must be combined with confidence, motivation, and a sense of belonging. Behavior change is more likely when people feel supported and valued, and long-term engagement depends on emotional and social connection. This reinforced the idea that sustainability and safety science must be human-centered.

This project also showed me how inequities affect resilience. Many of the youth and families involved face barriers such as limited access to healthcare, education, transportation, and stable resources. These barriers increase their vulnerability to environmental and public health risks. However, the evidence from this project demonstrated that when education is accessible, culturally responsive, and youth led, it can reduce these gaps. Participants were able to understand complex concepts, apply them to real-life situations, and take meaningful action.

One of the most important lessons I learned is that youth are not just recipients of information — they are leaders and change-makers.

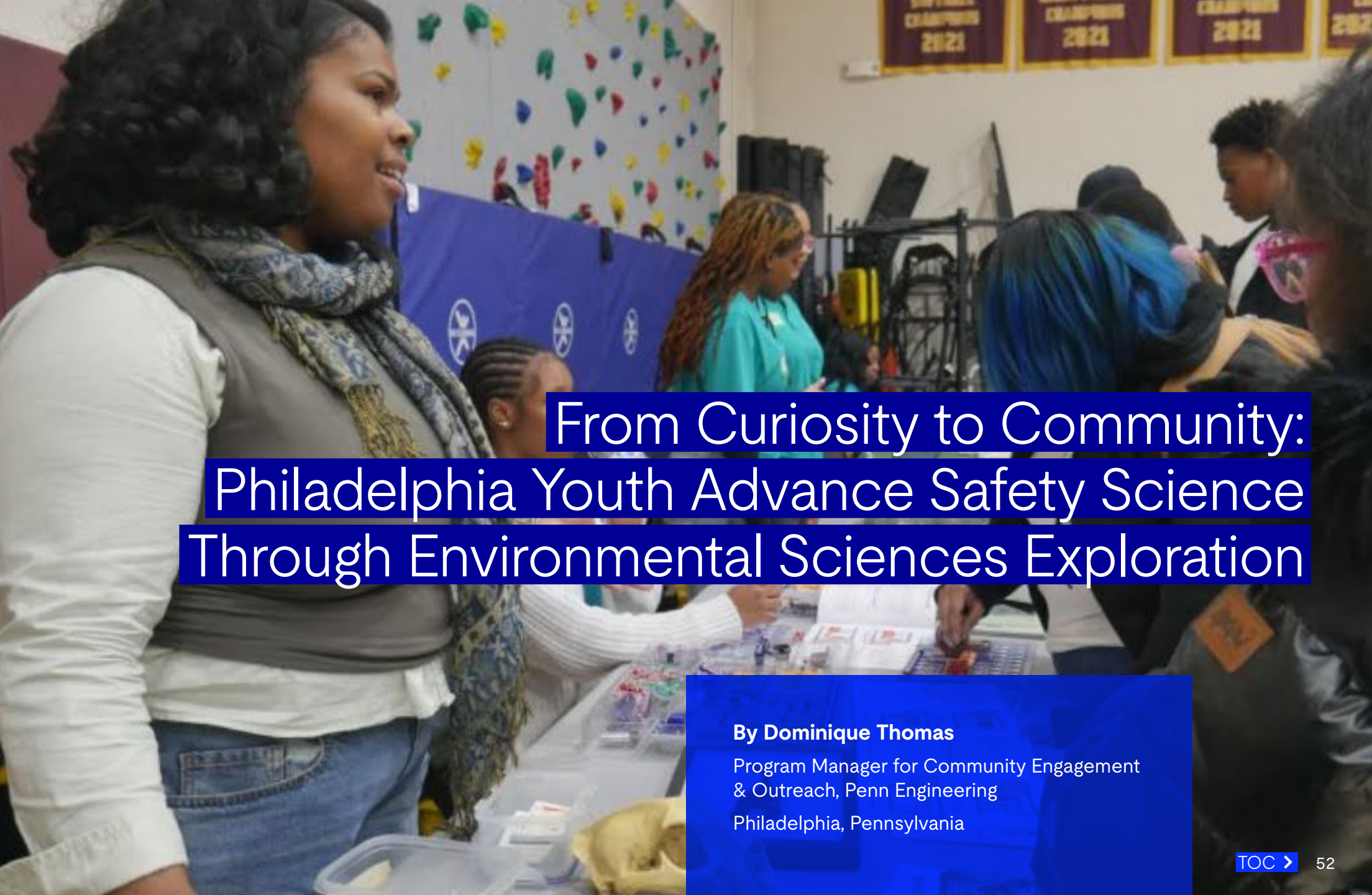
When young people are given the opportunity to lead, supported with knowledge, and included in decision-making, they can play a powerful role in strengthening their communities. This experience changed how I see leadership. It is not just about guiding others, but about creating opportunities for collaboration, listening to community voices, and using data to inform decisions.

Overall, this project demonstrated that youth-led, community-based education can significantly improve knowledge, preparedness, and engagement related to sustainability and safety. It also showed that building resilience requires more than information — it requires access, inclusion, and empowerment.

This experience has shaped how I think about science and community work. I now understand that environmental science is not only about studying the environment, but about applying that knowledge to improve people's lives — that is safety science. By integrating environmental science, public health, and civic engagement, I was able to contribute to a project that supports long-term resilience and well-being for Phoenix, Arizona.

In the future, I hope to continue developing initiatives that center youth voices, use data to guide action, and address real-world challenges. This project showed me that meaningful change is possible when communities are informed, engaged, and empowered — and that youth can lead the way in building a more sustainable and resilient future. ■

Community health workers engaging with Xplorlabs' Science of Thermal Runaway resources.



From Curiosity to Community: Philadelphia Youth Advance Safety Science Through Environmental Sciences Exploration

By Dominique Thomas

Program Manager for Community Engagement & Outreach, Penn Engineering

Philadelphia, Pennsylvania

In my experience working as a program manager for Women in Natural Sciences, I was encouraged to engage in this fellowship opportunity to support informal STEM enrichment for 9th-12th grade students across Philadelphia. Through my experience in the Xplorlabs Educator Fellowship, I was inspired to reshape student experiences in learning environmental science by supporting connections to their community and empowering youth-led action projects. While exploring the learning pathways on Xplorlabs, youth expanded their knowledge of safety science and were encouraged to lead STEMonstrations during local youth-in-STEM community workshops. These events and workshops were hosted throughout the year by a collective of out-of-school time science enrichment programs including Chief Science Officers, Hidden Genius, and the Women in Natural Sciences.

The youth who initially engaged in the Xplorlabs learning pathways and were encouraged to lead STEMonstration workshops were active participants in the Chief Science Officers and Women in Natural Sciences. The Chief Science Officers are a special group of youth leaders who identify and pursue advocacy projects to impact some of the most detrimental challenges faced on local and global level. With their prior experiences in environmental sciences through engagement in the Women in Natural Sciences, youth were able to make connections to the classroom content where they were learning about the history of harnessing energy. Their summer experience also included a field trip to Pioneer Tunnel Coal Mine in Ashland, Pennsylvania.

The hidden geology of your phone: A youth scientist's perspective

Through collaboration with two Philadelphia scholars participating in the Pennsylvania Chief Science Officers and the Women in Natural Sciences, we set out to share our Xplorlabs experience with members of our local STEM community. Youth used The Science of Extraction to E-Waste pathway to explore supply chains for manufacturing some of their favorite tech devices. They also used the pathway to examine the environmental impact from mining to e-waste. Youth were motivated to expand their understanding of global impacts that arise in environmental challenges concerning e-waste, and expressed concerns in how underdeveloped countries may be unequally impacted by environmental challenges. Youth were inspired to work together on a call-to-action plan to address e-waste issues on both local and global scales, helping to promote sustainability for future generations.

The youth led workshops at community-based STEM days hosted at museums and schools in Philadelphia. Our goal was to engage participants in meaningful conversations about technology's role in everyday life. We wanted to highlight how technology brings efficiency and connectivity, while also emphasizing the significance of the associated global environmental and societal costs, which are often underestimated. Through interactive activities and discussions, these workshops encouraged attendees to think critically about both the benefits and the hidden consequences of technological advancement, fostering greater awareness and responsibility among community members.

Through engagement in the Xplorlabs Educator Fellowship, educators can empower students to question, explore, and make meaningful connections while contributing to the broader science community. By fostering curiosity and critical thinking, teachers help students see themselves not just as learners, but as active participants in STEM fields. ■

Students created models of their environment to demonstrate how mining impacted the community and ecosystem.

Two Chief Science Officers shared their experience with Xplorlabs

"My experience with Xplorlabs' safety science pathways has educated me on the many impacts our devices have on the Earth. By using maps and visual representations, it showed me how many parts of the world are suffering from e-waste." –Taraji

"Through CSO and Xplorlabs, I learned how circuits and technology work and why safety matters. I also became more aware of how lithium-ion batteries can impact the environment. This experience helped me think more critically and use science to make better choices in the future." –Maniya

When Students Become the Teachers

By Abigail NeSmith
8th Grade Physical Science Teacher
Marietta, Georgia

It's OK to know that you don't know

I have been teaching Earth science for 10 years and was moved into physical science this year. I was overwhelmed by the content change and began searching for support and teaching resources. As I perused, I came across Xplorlabs and the Xplorlabs Educator Fellowship. It made sense to apply as it was a perfect opportunity to gain resources — which is all I thought I would gain out of it, but man, was I mistaken.

Upon the very first meeting, I knew I was in for the professional development opportunity of a lifetime. Sitting in the room, I was surrounded with like-minded teachers sharing their thirst for knowledge and drive for phenomena-based instruction. We spent the next three days engaging as students and honing our teaching skills. We left inspired and excited to share our expanded understanding of 3D instruction with our students and colleagues.

Making student learning tangible

One of the Xplorlabs pathways that resonated with me was The Science of Fire Safety. Our school has many students who live in trailers, as well as multiple generations who live in one residence. It was important to me that students had an understanding of the necessity of fire safety. By design, the Xplorlabs resources are perfectly aligned with chemical change and energy transfer standards. To start, we began exploring how heat moves during a fire.

We began with the Fire Safety Research Institute's research-backed "Close Before You Doze" campaign. In these videos, students observed the effects of fire with the door open versus closed. Students were shocked at the damage the fire caused with the bedroom door open. They became extremely interested in how fire develops and grows. I saw an opportunity to integrate resources from The Science of Fire Forensics pathway that compared how natural and synthetic materials burn. I collected various materials that resembled the materials of furniture they had at home.

We conducted the energy and combustion investigation where students burned different fabrics. They compared the smell and speed at which the materials burned. As a result of our investigation, students realized the impact that modern synthetic materials have on escape time from a fire and the impact this has on the safety of their families. It was this realization that made students take charge.

Facilitating is the best teaching

Students quickly connected the type of materials used in their homes to the time they have to escape. This realization inspired them to take action. Our school has a yearly "Breakfast with Santa" holiday celebration. At this event, the community comes to the school to dine and meet Santa Claus. Students identified this as the perfect time to engage with a large number of community members. They set up their booth next to the line to meet Santa. They selected a place where everyone had to walk by — they would definitely be heard.

Students wanted to reinforce the "Close Before You Doze" campaign, and also wanted the

community to know about the importance of working smoke alarms, understand the flammability of synthetic materials, and why everyone should have a fire escape plan. They researched the best way to make these messages meaningful, and discovered that fire departments will install smoke alarms for free. This was an opportunity the community needed, because some families were not comfortable interacting with government agencies. Students brought firefighters onsite to spark positive relationships between them and the community.

Planning the entire experience themselves, students brought samples of natural and synthetic fibers, fire blankets, and large whiteboards so families and fire professionals could discuss escape planning. They also provided computers so families could sign up for free home smoke alarm installation.

Sometimes letting go is the most productive

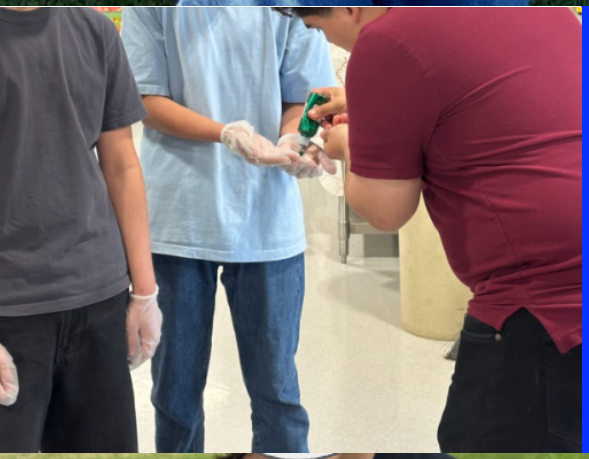
The students took control of the event, translating effortlessly between English and Spanish. You could see the families start to make connections with the students. As parents relaxed, they began to ask questions and lean on the students as experts. The students were able to share what they had learned and give relevant evidence to support their ideas. I saw students turn into teachers, leaders, and change-makers. They were once timid and afraid to talk to strangers, and they became an inspiration as their confidence grew.
The students talked to more than 600 families. Countless fire escape plans were illustrated and photographed. A number of families signed up for free fire detector installation. Firefighters were able to challenge the preconceived notion that all government agencies are bad.

I saw a community come together and become safer because of the desire of a few inspiring young voices.

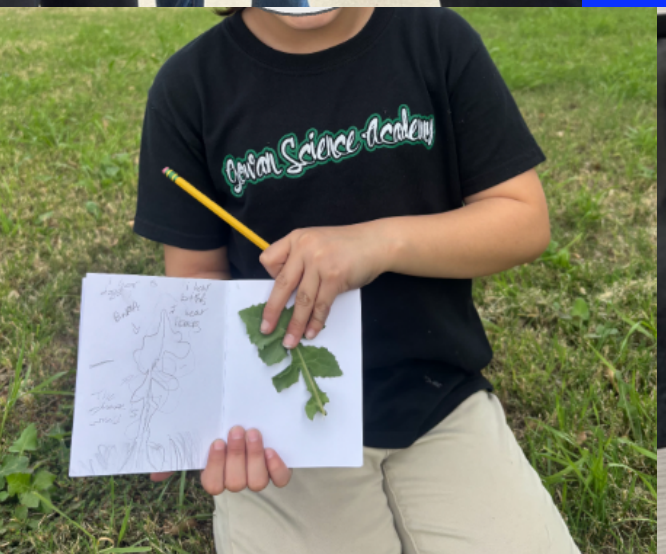
Science ambassadors are born

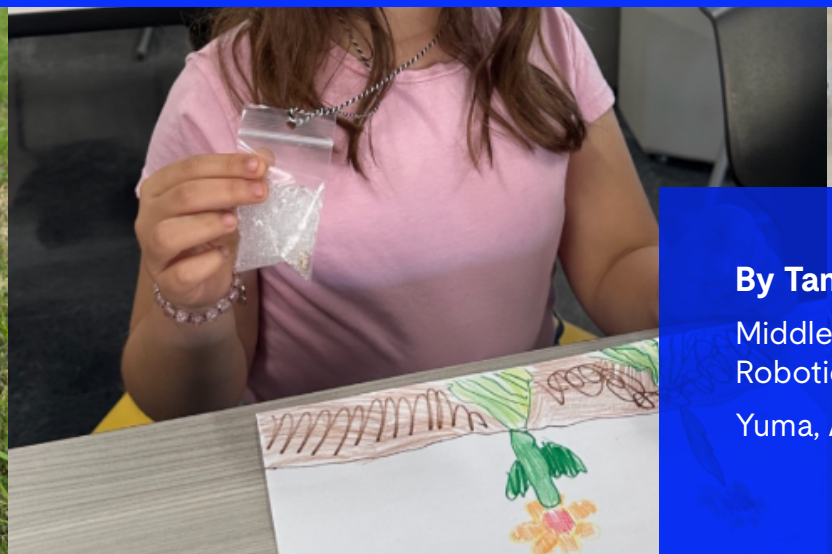
After a successful activity, you always wonder if the momentum will last. I am fortunate to share that it has! A few weeks later, it was time for science night at our school and when the students heard about it, they wanted to know how they could participate. The students again took control. They ran hands-on investigations and explained science phenomena. I watched them become educators and leaders once again.
With the success of science night, we began a vertical grade science ambassadorship. Students in 8th grade can share their knowledge with 6th and 7th graders. The hope is that the love for science will continue to grow throughout the school and community.

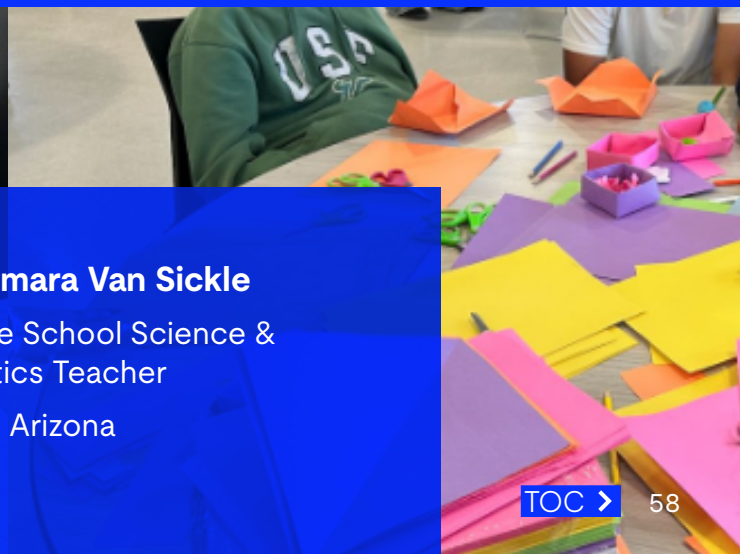
When I began using Xplorlabs, I thought it was a great resource that illustrated 3D science learning with real-world phenomena; however, Xplorlabs also facilitates and engages students in real-world challenges and enhances their natural wonder and curiosity. As educators, it is our job to give students the tools and opportunities to be their very best. As an Xplorlabs Educator Fellow, I was given the same opportunity. The fellowship allowed me to grow and nurture my students as I have been nurtured by the program and community of educators. Education has a trickle-down effect, and I am very thankful for the opportunity to be inspired and share my inspiration with my students. We are all better for it. ■



Creating Civic-Minded Community Advocates in Southern Arizona







By Tamara Van Sickle

Middle School Science & Robotics Teacher

Yuma, Arizona

This year, after my many years in various elementary roles, I moved to middle school science. When the Xplorlabs Educator Fellowship was originally presented to me as an opportunity, I knew I had to apply. I wanted to have the fellowship experience so I could grow my professional knowledge and expand my students' learning. The program aligned with everything that I hold as my beliefs in quality education and learning experiences for young minds, turning abstract concepts into tangible experiences. I was excited to see my students improve their problem-solving skills and increase their confidence by learning through trial and error, all in a safe environment.

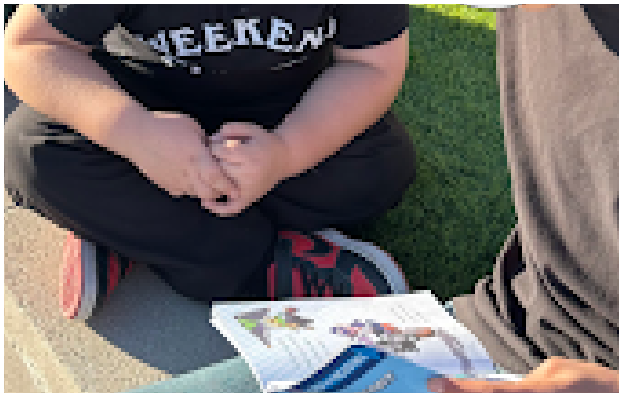
The Fellowship Summit was a blur of learning, both as an experienced teacher with a wide science background and as an adult learner of science. That first fellowship event allowed me to make connections between many of the Xplorlabs pathways, my standards, and my district-approved curriculum. I was able to connect The Science of Extraction to E-Waste pathway to my unit on human impact on the environment, while also utilizing the students' learning about the periodic table when discussing the different elements that make up lithium-ion batteries through The Science of Thermal Runaway pathway. I was able to connect the content to the building of multiple data centers and a cobalt processing plant (the first on U.S. soil). Being able to connect Xplorlabs to events that are happening in my students' everyday lives made an immeasurable impact.

What made my journey through the Xplorlabs Educator Fellowship truly unique was the way my students became more than learners — they became investigators, collaborators, and teachers.

This school year, my 8th grade students took ownership of their learning. This wasn't just a series of learning experiences through the Xplorlabs pathways, but an extension of both the learning and my students' inquisitive nature. When my students learned about e-waste and the negative environmental impacts that improper disposal can have on the land, the air, and our water, this turned into a larger project on understanding what resources our community has available. This learning then extended to water insecurity in our area. My students wanted to focus on issues that come from water pollution, both from mining and agricultural runoff. They took what they learned in the Xplorlabs pathways to extend their knowledge of what effects e-waste can have in an area. This project allowed for real-world exploration rooted in our own community in Yuma, Arizona.

After studying water availability in the Southwestern United States, my students decided that their next steps were to design and conduct surveys across our school to better understand how water is used at home and on campus. They collected real data on water use, energy consumption, and waste production — data that reflected the reality of their own lives and community.

Top: Students worked on a lab that tested water temperature and contamination effects.
Bottom: Students worked through labs that taught them about water contamination.



An 8th grade student with his 1st grade "buddy," analyzing text and illustrations that tell a story.

Then those same students turned around and taught our 1st graders. They created meaningful learning experiences for them, which included lessons on the water cycle, soil types and development, and how plants and animals use soil to better survive. My 8th graders also worked with the younger students to create art projects on those topics, learning about story and character development when you are an author/illustrator. Their goal was to write and illustrate books to help younger students understand how humans can impact the environment, positively or negatively, and what steps can be taken to lessen our impacts. Seeing my students step into that leadership role embodied the action-oriented pedagogy model in an authentic, lasting way. A moment I won't forget was a student saying, "If we don't take care of our water now, we're the ones who will have to live without it later." That shift — from learning about a problem to feeling responsible for it — is what made this experience so impactful.

How would you, as an educator, replicate this?

If there's one thing I would encourage other educators to do, it's to let students do work that matters beyond the classroom. If you do, this experience for you and your students will unfold in a completely different and meaningful way.

Connect your content to issues your students can see in their own community. Give them opportunities to collect real data, talk to real people, and create something that has a purpose outside of the gradebook and the confines of your school.

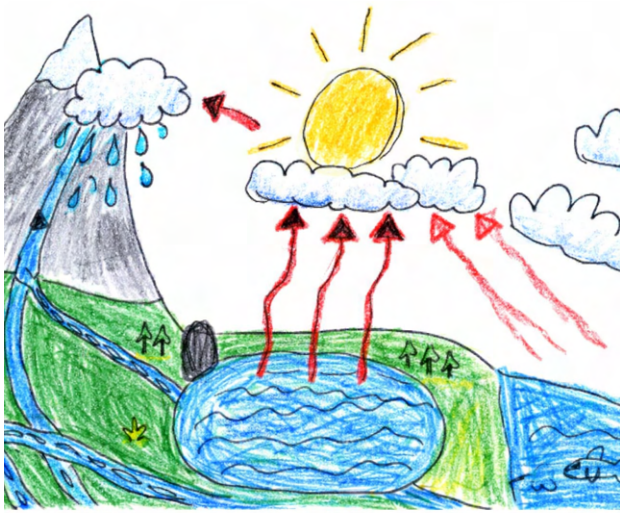
Most importantly, trust your students with the responsibility to impact their community. When we allow them to take agentic action — whether that's teaching younger students, presenting findings, or creating resources — we show them that their voice has value.

You don't need a perfect plan or a yearlong fellowship to begin.

Teach one lesson from Xplorlabs and facilitate experiences where students:

- Investigate real-world issues
- Collaborate with others (even across grade levels)
- Create something that leaves a lasting impact

When students see that their learning can influence others, everything changes. They move from passive participants to active contributors — and that's where the deepest learning happens. ■



Children's book on water conservation, collaboratively created by an 8th and a 1st grader.

Biology of Batteries: A Hands-On Exploration of Resource Extraction and Land Reclamation

By Katie Villier

High School Biology, Chemistry & Physics Instructor

Greenville, South Carolina

"Tell me and I forget, teach me and I may remember, involve me and I learn."

Student investment is key to learning! I have taught biology for the last seven years and, in an effort to change things up, I took a new approach that gave students the opportunity to see human impacts on the environment firsthand. Students were completely involved from start to finish and took ownership of their learning experiences.

Biome building

I started by adapting Xplorlabs' Modeling Mining Processes Investigation to a high school level while maintaining the integrity of the exploration. Each student was assigned a biome and a natural resource used in the production of lithium-ion batteries. They were then tasked with creating an accurate representation of their biome in a diorama including appropriate flora, fauna, soil, etc. I provided my students with building supplies (moldable dough, soil, sand, rocks, etc.) to create a variety of terrain types. Students had access to a Plant and Animal Depot, where they could "shop" for any species needed to create an authentic biome. They added unique touches and labeled each species with its scientific name. They were also required to bury their assigned resource in the soil layer. These resources would be excavated later in the project, but my students didn't know that yet! Part of the fun was letting the journey unfold in front of them.

Mining mayhem

A moment that stuck with me in this lesson is when I disclosed that they would be conducting mining operations. A collective "WHAT?!" was heard around the room, followed by a chorus of groans and sighs. They were not thrilled with having to damage their biomes! However, it would give them a glimpse into the negative impacts humans can have on the environment.

The students gathered background information using The Science of Extraction to E-Waste pathway, conducting research and connecting that research to their models. Next, they were tasked with replicating the extraction process to scale on their model. Their mine site needed to include a road (rock/pebbles), two construction vehicles, a mining building (cardboard), a supply bundle (straw), and an energy source (magnetic wire). Once their site was set up, they started a timer and began extraction. They weighed the material they collected and calculated the percentage recovered.

Most students took their time selecting a mining location that would have the least environmental impact, where they could "relocate" species as needed. Others were more focused on achieving 100% resource extraction, no matter the environmental costs. They took photographs to document damage to their ecosystem and completed a Post-Mining Environmental Impact Assessment (PMEIA) based on real EPA documentation. Students enlisted their peers to act as EPA surveyors and complete assessments on their models. These procedures directly align with the planning and documentation mining companies have to submit, giving my students an experience that was truly representative of careers in these fields.

Aim to reclaim

After assessments were completed, my students were relieved to hear that we would be creating reclamation plans to restore their biomes. My students closed their mining operation, created a reclamation plan, and restored their ecosystem in preparation for an "Environmental Performance Inspection" by an EPA supervisor — me!

The PMEIAs completed during the last phase helped to determine the major areas of focus for restoration. Students created a multistep plan that they presented for teacher approval. Once approved, students started implementing their plans, visiting the Plant and Animal Depot to restock native plants and animals, and repairing any soil or land damage. Most of their environments were restored or even upgraded to become more stable and biodiverse than before mining took place!

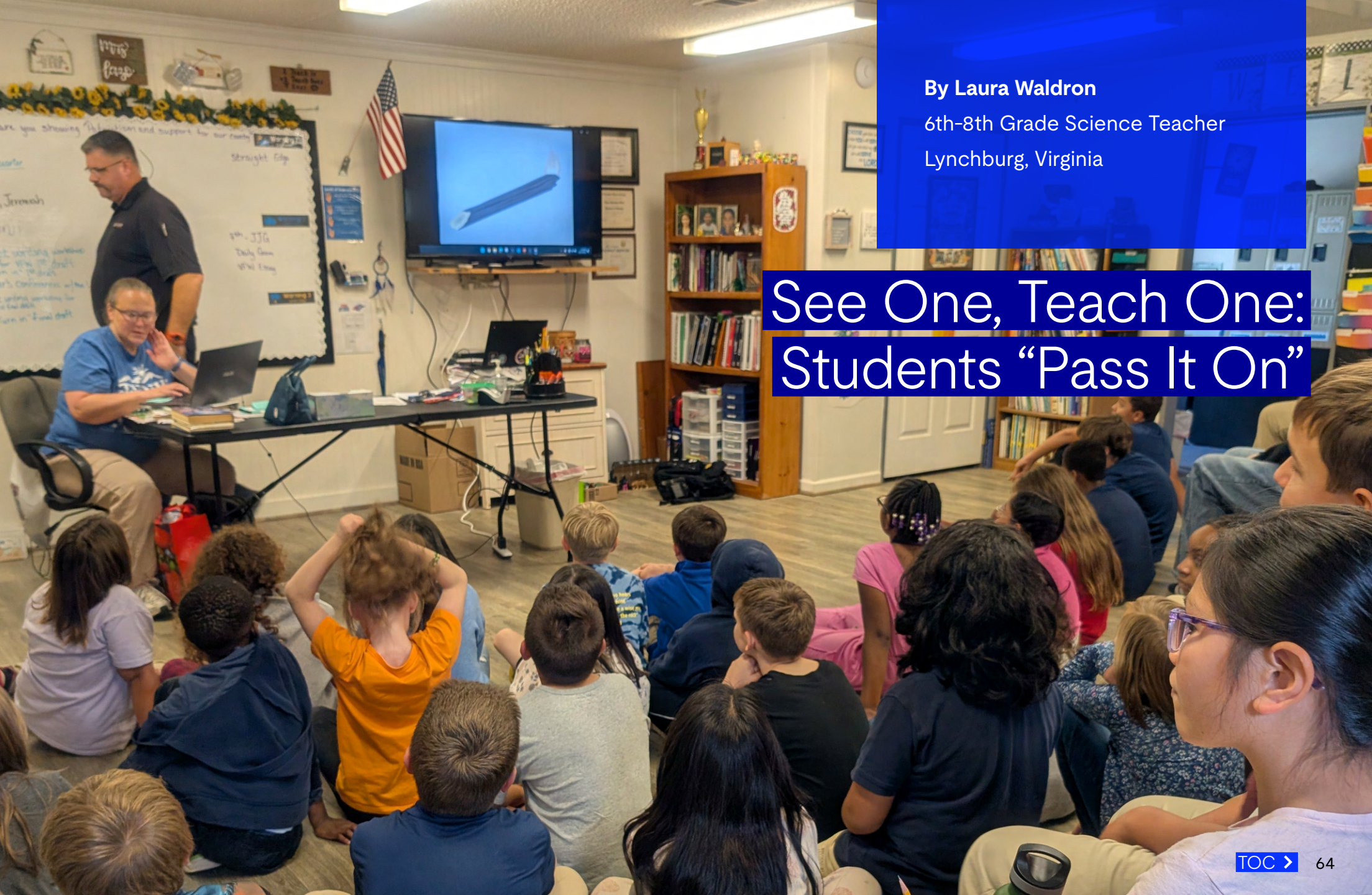
Making real-world connections

Another major moment was watching the culmination of all my students' hard work as they presented their models and research to the AP environmental science students. Each of my students needed to make a presentation about their biome and resource, the damage caused by mining, and their reclamation process. Throughout the lesson, they developed a sense of ownership and pride in their dioramas that was conveyed during their presentations. The evolution of their models from initial building to reclamation demonstrated how my students were able to understand and apply the standards through science and engineering practices.

Students spent time thinking about the pros and cons of the resource extraction needed to create lithium-ion batteries. Using Xplorlabs' videos and interactives, my students explored the value of LIBs to society and their most important use — powering cellphones. Despite their love for phones, the students also understood the cons of LIBs based on their firsthand experiences. They highlighted the real environmental impacts that resource mining has on our planet.

Hopefully students are encouraged to appreciate their devices and maybe even investigate more environmentally friendly resource acquisition methods.

In a world where lithium-ion batteries are a part of everyday life, this experience made the students realize how crucial it is to find a balance between resource extraction and environmental protection. ■



By Laura Waldron
6th-8th Grade Science Teacher
Lynchburg, Virginia

See One, Teach One: Students "Pass It On"

See one: The Xplorlabs Educator Fellowship Summit

The most amazing part of this Xplorlabs Educator Fellowship journey, which began with a Fellowship Summit, was how it inspired me to create a lesson plan that was fun, made memories, and even taught younger kids outside my classroom. I started this entire experience thinking that what I would be doing is simply going to a summer class and perhaps taking home some interesting ideas to implement in the school year. I had no idea it would result in an impactful, well-designed entire unit that put students and their creations at the center of a learning event that had ramifications for the entire school.

When I began developing a learning experience using Xplorlabs, I was initially uncertain how I might implement it. As I listened to other fellows and learned from the instructive, constructive, and collaborative critiquing process, it became clear to me how I might utilize Xplorlabs in my classroom.

Teach one and pass it on!

We designed a room about the size of a doll's house. Students brought in small fabrics to be the curtains, bedspreads, and other items in their "room," which helped us understand fabrics and ultimately to contrast the flammability of synthetics and "natural" fibers. The local fire chief came to the classroom and acquainted us with safety issues as he demonstrated fire behavior with their model rooms. We analyzed the burns using the guidance we'd learned from The Science of Fire Forensics pathway, and then returned to the class for further discussion with the fire chief. He shared information about fire prevention and escape routes and answered student questions. The students were really engaged.

My students each made a presentation with fire safety facts and recommendations that they then presented to a younger class, fielding their questions. It was a total learning situation for everyone, and I was so impressed with how my students handled it. One younger student expressed concern that he couldn't pick up his dog and get him out if there was a fire. My student calmly explained to use an escape route and get out of the house, and that parents or firefighters will pick up the dog.

Students created model rooms with a variety of materials to test fire behavior.

Win, win, win

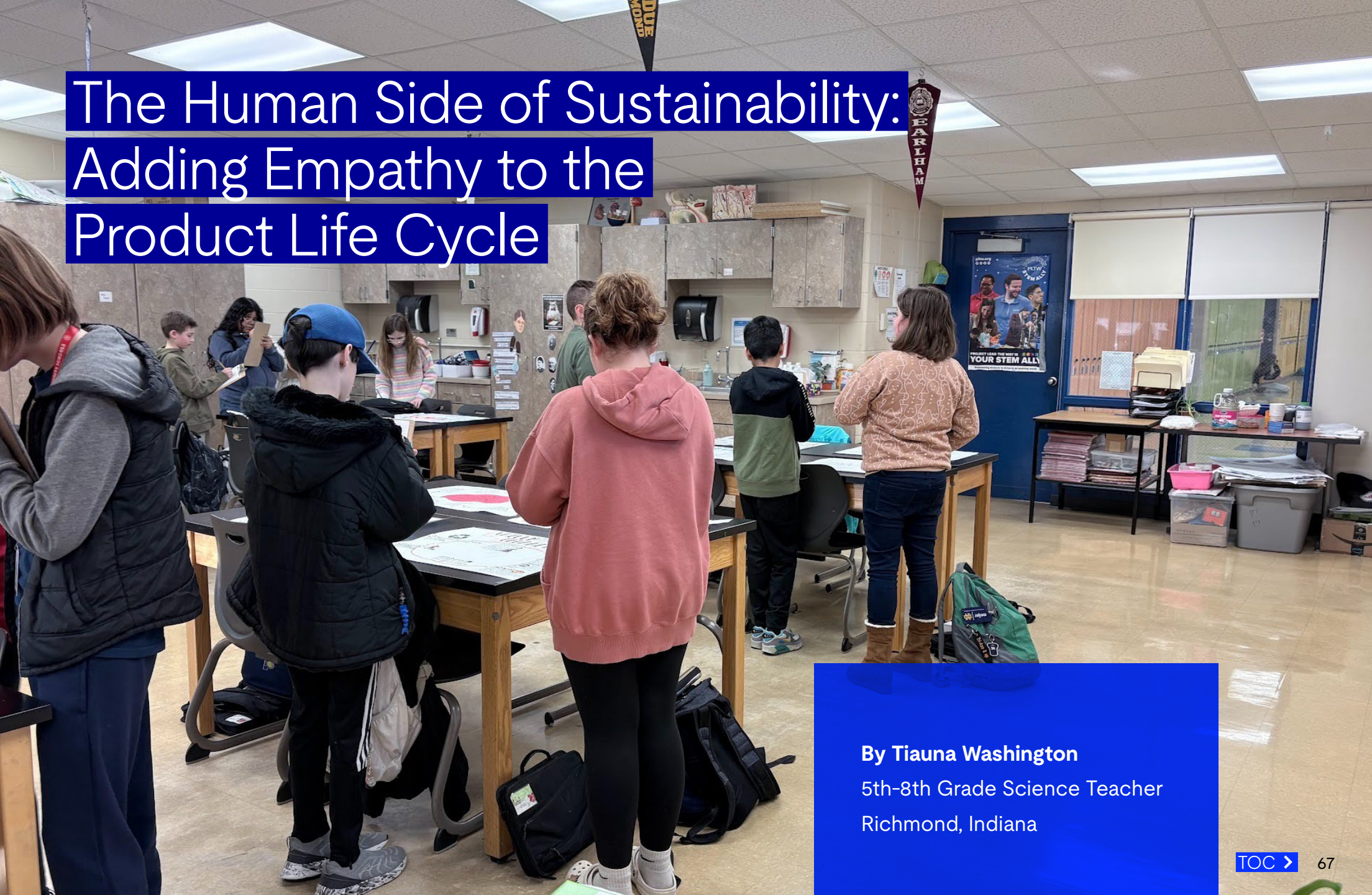
To anyone who is reading this story, my class is as diverse as one can possibly imagine! We have an extremely diverse group from many backgrounds. The use of fire is so compelling that everyone's attention was captivated, and their real-world lens with which we approached the content allowed their differences to shine. Students were able to reflect their artistic talents in their room designs, digital talents in their presentation creation, and those with a talent for presenting were able to connect with their listeners. The younger kids learned and took away real, practical safety instructions from the presentation.

So what is the takeaway? Using Xplorlabs and participating in the Xplorlabs Educator Fellowship was a total win, win, win (no, that is not a typo)!

Teachers win with interested, involved students and students win with higher engagement and retention.

Talking about their experiences with house fires builds a real-world, emotional connection that increases retention of material and makes the information relevant. What will your classes do? Although I can't answer that for you, it will be a fantastic experience! ■

The Human Side of Sustainability: Adding Empathy to the Product Life Cycle



By Tiauna Washington
5th-8th Grade Science Teacher
Richmond, Indiana

What was I getting myself into?

When I was selected for the 2025-26 Xplorlabs Educator Fellowship, I jumped at the opportunity to collaborate with teachers from around the country and find more creative and engaging ways to teach my students about sustainability, particularly with product life cycles. At Hibberd Intermediate School, I teach 5th-8th grade middle school, high-ability, science and engineering students using Project Lead The Way courses.

The course that I decided to focus this fellowship-inspired learning experience on is called "energy and the environment," where students are challenged to think big as we explore ways to discuss and find sustainable solutions to our energy needs. I teach this course to my 5th and 6th grade students, and it serves as a precursor to the spring semester course called "green architecture".

The fall semester started out normal, but unfortunately I ended up having two surgeries one month apart and lost some considerable time with my students. Despite this setback, I knew I had a game plan using Xplorlabs' Science of Extraction to E-Waste pathway to help supplement teaching my students about the product life cycle of products that they use in their daily lives.

Xplorlabs resources come to the rescue

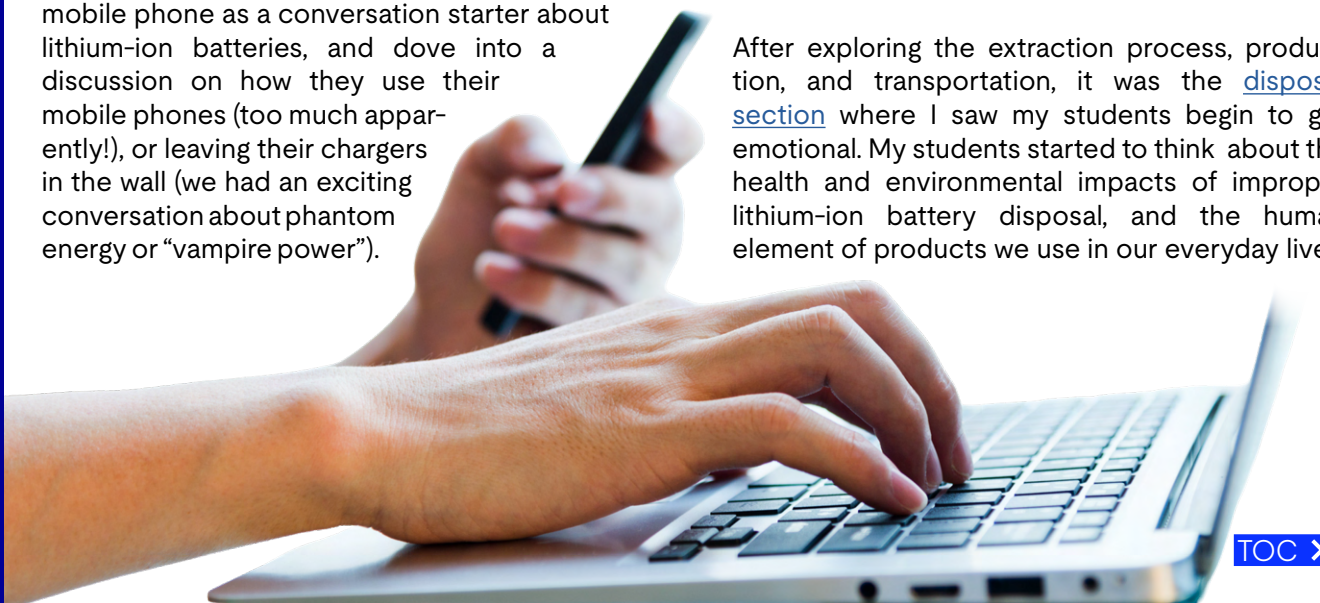
We started our Xplorlabs journey in November, and each student was given a copy of the Extraction to E-Waste Student Guide to read and keep track of their learning — in this case, lithium-ion batteries and the natural resources that are extracted for our cellphones. The students were engaged from the beginning when I used my mobile phone as a conversation starter about lithium-ion batteries, and dove into a discussion on how they use their mobile phones (too much apparently!), or leaving their chargers in the wall (we had an exciting conversation about phantom energy or "vampire power").

Afterward, we explored the history of lithium-ion batteries, who the "father" of lithium-ion batteries was, looking at land use and how it changed over time, and the raw materials extracted from various sources around the world.

When learning the extraction process, I saw empathy from my students for those who extract these raw materials, allowing them to have their own cellphones today.

Empathy goes a long way

After exploring the extraction process, production, and transportation, it was the disposal section where I saw my students begin to get emotional. My students started to think about the health and environmental impacts of improper lithium-ion battery disposal, and the human element of products we use in our everyday lives.



Next, students started to research and make their life cycle posters. The products that they chose for their posters included gaming systems, toothbrushes, pencils, mattresses, and more. The students were given a week to research and create their product life cycle poster. On the final day, we held a gallery walk for students to review each other's posters and learn about products they chose. It was rewarding to see their posters and hear them explain why they chose the product and what they learned. I was so proud of their posters that they remain hung in the hallways for the other students to see. Many teachers and students paused to look at my students' posters and were impressed with the final results.

The students continued to return to discussions about disposal, which showed how impacted they were by their learning. The multidisciplinary perspectives in the pathway really opened my students' eyes about the importance of understanding a product's life cycle, from creation to disposal.

Many expressed wishes to change their family's habits and be more mindful about the environment.

So, what's next?

I highly recommend that educators check out the amazing resources that Xplorlabs has to offer, especially if you are teaching about sustainability. Bringing real-world experiences into the classroom and having deep conversations with my students about the world around them was rewarding. Students proposed solutions like finding new ways to engineer products so they don't have to go to landfills. My students had such great ideas that I told them to get a patent and remember their middle school engineering teacher when they became famous!

This fellowship has also made me rethink how to teach certain topics and go beyond what we typically teach in our classrooms. It's OK to take a break from lectures and PowerPoints to have more deep conversations or debates with our students. It was nice to hear from my students about their thoughts, learnings, and enduring messages they want to share with their families. I can't wait until the spring semester and look forward to continuing to incorporate Xplorlabs resources. ■

Student posters depicting product life cycles.

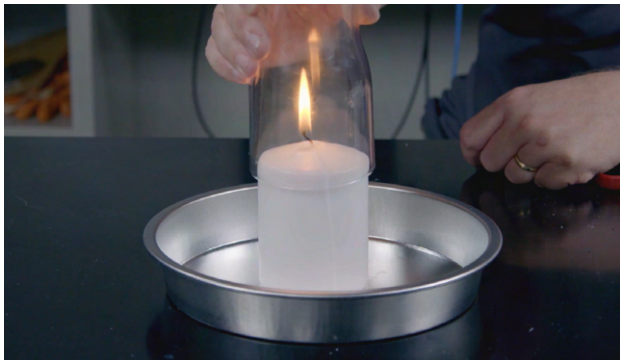
Back to Basics: The Captivating Power of Fire Science

By George C. Weber Jr.
10th-12th Grade Biology, Forensic Science
Philadelphia, Pennsylvania

The best laid plans: Navigating the 35-minute reality

When I first designed my 15-lesson unit for the Xplorlabs Educator Fellowship, I had ambitious goals. I wanted to bridge the gap between the physical world and the digital one, connecting the chemistry of fire and the practice of fire investigation with the reality of the digital landscape and how digital footprints support investigation. In my head, this was the perfect "off-ramp" to teach digital literacy. As most educators know, the plan never quite works out. What makes a good educator is the ability to adapt in real time, creating an impressive learning experience while still keeping in mind the original goal. The classroom has a way of telling you what it holds the capacity for.

Implementing a complex unit in 35-minute periods is a logistical puzzle. As we began Xplorlabs' The Science of Fire Forensics, I quickly realized that the science of fire wasn't just a hook, it was the main event. There was so much to learn about the science of fire and the curiosity of the students and their own experiences led to many side conversations and the need for a much deeper dive into fire forensics. I realized the complexity of weaving in the digital literacy aspect to the concepts of fire science would put us over capacity. I made the executive decision to pause the digital literacy goals. We didn't need an "off-ramp" — we needed a deeper dive into the burn.



The spark: Rediscovering the fire triangle

We started our journey with foundational knowledge of the fire triangle. In a world of high-tech gadgets, there is still something primally fascinating about the relationship between heat, fuel, and oxygen. Using Xplorlabs' Science of Fire Forensics, which begins with an inquiry into what caused a fire in a burn scene, we started to dive in. Using these resources, we didn't just look at a diagram — we explored the energy release of chemical reactions.

The students were captivated by the live fire demonstrations.

Seeing the science in action transformed the classroom from a place of passive listening to a laboratory of active inquiry.

I watched students who usually struggle to engage with text-based lessons hold conversations about what they were experiencing. Opinions began to shift based on evidence and data. By focusing solely on the forensics, we were able to spend more time using the Xplorlabs simulations to map fire spread in a real post-fire scene. Instead of rushing through the physics, we let the students sketch, predict, and debate the dynamics to make claims about origin and cause.

Evidence in the ashes: Becoming investigators

The middle of our unit shifted from theory to practice. We dove into evidence collection using the Xplorlabs Investigators Academy, as part of the fire forensics pathway. This was a turning point for my students. We spent three full class periods mastering the art of the mock evidence log. This weaved very nicely into my forensics curriculum. Using the Xplorlabs pathways wouldn't seem disconnected or out of sequence with a traditional journey through forensics curriculum.

The students learned that fire investigation is a meticulous process of elimination. They wrestled with the challenges of distinguishing between accidental and intentional fires. We turned the classroom into a staged fire scene, and I watched as groups used their scene diagramming skills to piece together a story from "char" (black construction paper) and "v-patterns" (tape on the walls).

One of the most powerful moments came when a student realized that the science they were learning had real-world consequences. "If we get the science wrong," they noted during a class discussion, "an innocent person could go to jail."

We focus a lot in our forensics discussions in general about how our expertise in this field is so important in the process of law in the United States. We are literally helping to determine the consequences of life. This weight of responsibility is what forensic investigation is all about. Stripping away the digital literacy layer gave us breathing room to explore the ethics of physical evidence and the rigor required by the scientific method.

Reflection: The value of depth over breadth

This fellowship has taught me that less is often more when it comes to profound learning. By narrowing our focus to fire forensics, I was able to honor the students' engagement and provide them with mastery of the subject that a broader unit might have diluted, given the time restraints. I think that connecting fire investigation to digital evidence is purposeful and relevant given today's current state of affairs, and I look forward to making that connection in the future. However, it would be a disservice to implement it haphazardly. We needed to first build a full picture of fire investigation, so students had skills to build on. Foundational skills that students develop from investigation will still be important to support their digital investigations when the time is right.

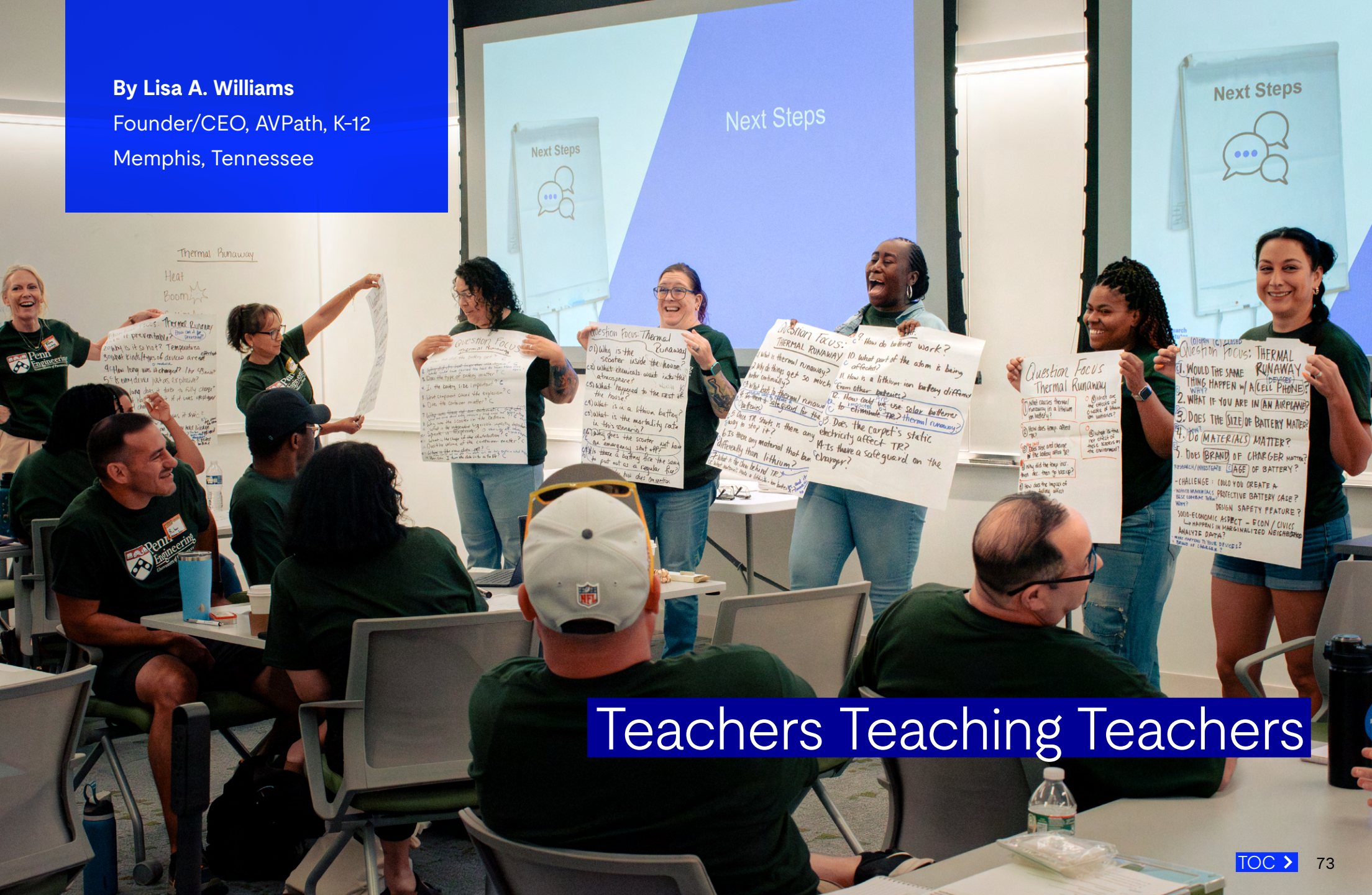
The sticking point of time, as always in the classroom, those 35-minute windows, forced me to choose between a surface-level survey of two topics or a deep investigation into one. I chose the latter, and the results were visible in the quality of the students' final investigative reports and presentations. They weren't just reciting facts. They were defending their findings with scientific evidence.

Teachers have the fortune of a fresh slate each year, and since forensics is an elective, I have flexibility with my curriculum. While digital forensics didn't fit this year, it is a valuable extension of fire forensics. With some planning and purpose I believe it is a worthwhile storyline that will engage students.

For this year, the story of my fellowship is the story of the fire itself: bright, engaging, and worthy of our full attention.

If you are ready to see the science in action, I highly recommend visiting Xplorlabs and exploring the fire forensics pathway. Don't be afraid to let your students' curiosity lead the way. Sometimes the best learning happens when you're willing to set the original plan aside and follow the smoke. ■

By Lisa A. Williams
Founder/CEO, AVPath, K-12
Memphis, Tennessee



Teachers Teaching Teachers

The revelation

My initial revelation was at the onset of the Xplorlabs Educator Fellowship Summit. I was amazed as I witnessed the various teaching styles of the educators in my cohort. The classroom conversations with other fellows taught me how to ask clarifying questions in order to provoke thoughtful discussions and intentional collaboration among group participants. I reached an epiphany when witnessing the example of how to create space for different learner types. I was able to participate in various exercises that taught me how to present easily digestible information while eliciting engagement from learners of all ages in any setting.

The teacher becomes the learner

During the Fellowship Summit at the University of Pennsylvania, we learned about the safety science education resources on Xplorlabs. It was fun to participate in hands-on activities to understand the impacts of mining and listen to fire experts demonstrating how to look beyond the flame to understand what is actually burning during a fire. Learning to look beyond the obvious led to a discovery of how gases were burning instead of what appeared to be a candle wick.

During the summit, educators, researchers, and scientists expressed the importance of teaching methodologies and ethics around technical learning. I used these experiences to help shape the implementation of a citywide event for students to learn about lithium-ion battery threats as they relate to aviation safety.

From learning to doing

After learning how to engage participants in meaningful discussions and draw correlations to the data being presented, my team planned a lithium-ion battery aviation safety event, called “Fire & Flight Day,” in conjunction with the 164th Airlift Wing, Tennessee Air National Guard. Students modeled the cycle of the lithium-ion battery from its beginning to its disposal, or better yet — recycling! During the event, students had the opportunity to tour a C-17 aircraft to learn about the cargo hold and the importance of keeping it safe from thermal runaway incidents. Additionally, students worked with the fire department on the 164th Airlift Wing to actually extinguish a fire.

A C-17 Globemaster aircraft.

Participants operated in each of four stages then presented their findings as elements of the model

Phase 1: Engineering Design (Containment)
The primary goal of this phase is to explore the safety challenges of lithium-ion batteries on aircraft, specifically focusing on containing a battery in the event of a fire to protect the surrounding environment.

Phase 2: Awareness, Recycle/ Disposal (Campaign for Disposal/ Recycling Batteries)
In this phase, students shift from safety to sustainability by focusing on the end-of-life cycle for batteries.

Phase 3: Mining and Reclamation (Habitat Simulation)
This phase focuses on the environmental impact of sourcing the raw materials (such as copper and lithium) required for battery production.

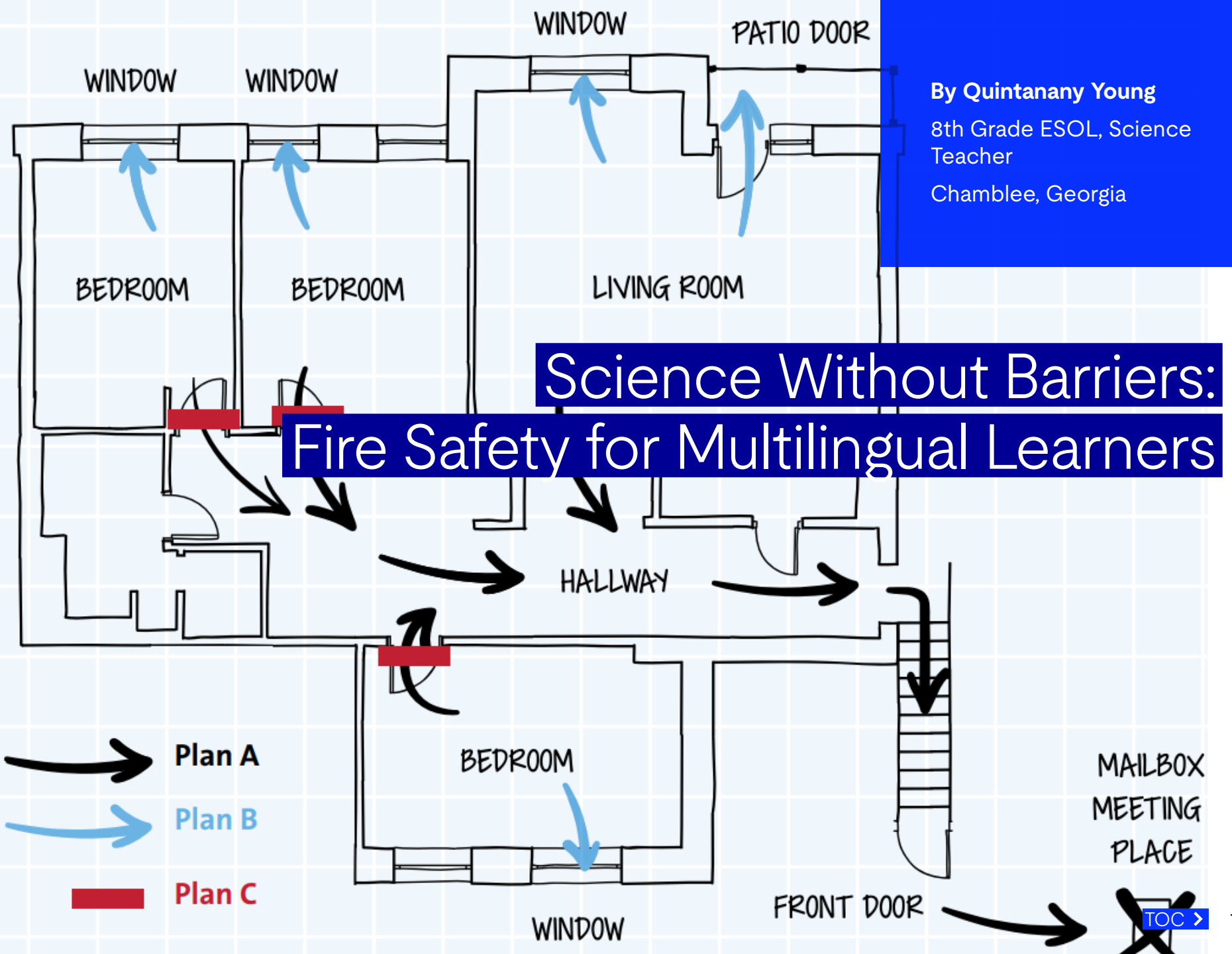
Phase 4: Public Awareness (Wrap Up)
Students presented their findings from the experiments and explained how they will work to create awareness in their community about the safe use of lithium-ion batteries.

Be inspired to share flight safety

Lithium-ion batteries pose a serious threat to flight safety. By creating awareness with Xplorlabs and the battery and aviation safety event, students became inspired to inform the community about fire safety and proper lithium-ion battery disposal. After learning about the potential dangers of lithium-ion batteries, we chose to spread the word on how to keep our community safe, as well as ways that the general public can help keep our skies safe for flight! ■

Science Without Barriers: Fire Safety for Multilingual Learners

By Quintanany Young
8th Grade ESOL, Science Teacher
Chamblee, Georgia



Connecting thermal energy concepts to real-world fire safety

My journey with Xplorlabs and the Xplorlabs Educator Fellowship has been unique because it allowed me to bridge rigorous physical science content with real-world safety, while intentionally designing learning experiences that support multilingual learners.

As an 8th grade, ESOL, physical science teacher in Georgia, I am constantly thinking about how to make complex scientific concepts accessible without lowering expectations.

The fellowship gave me an opportunity to take standards about heat and thermal energy (GA Science S8P2), and transform them into a meaningful investigation where students could apply science to understand fire behavior and safety in their homes and communities.

The learning experience I designed centered around a simulated kitchen fire investigation from Xplorlabs' Science of Fire Forensics. Students entered the classroom and were immediately presented with the aftermath of a fire scene. Instead of beginning the lesson with notes or definitions, they were asked to observe the scene, ask questions, and search for clues to determine how the fire started. Students had to think like fire investigators as they analyzed possible fuel sources, burn patterns, and how heat might have moved throughout the space.

What made this experience especially meaningful was seeing students move from curiosity to scientific reasoning. Rather than simply recalling vocabulary words like conduction, convection, and radiation, students were applying those ideas to explain a real-world situation. They built models, discussed possible causes, and debated their ideas with classmates. It became clear that the investigative approach allowed them to see science as a tool for solving problems rather than a set of isolated facts to memorize.

Science reveals safety

One of the most unforgettable moments from the experience happened during the investigation phase. Students were discussing how the fire might have spread through the kitchen when one student pointed to a burn pattern and said, "The heat probably moved up because hot air rises, so the fire spread this way." That statement captured exactly what the lesson was meant to accomplish. The student had connected the concept of convection to observable evidence in the investigation. At that moment, science had become visible and meaningful.

Another moment that has stayed with me came later in the lesson when we shifted the conversation toward fire safety and prevention. After learning how heat transfers and how fires spread, students began discussing how that knowledge could help people stay safe. As part of the activity, students designed escape routes for their homes and talked about how fire spreads through spaces like kitchens, hallways, and stairwells.

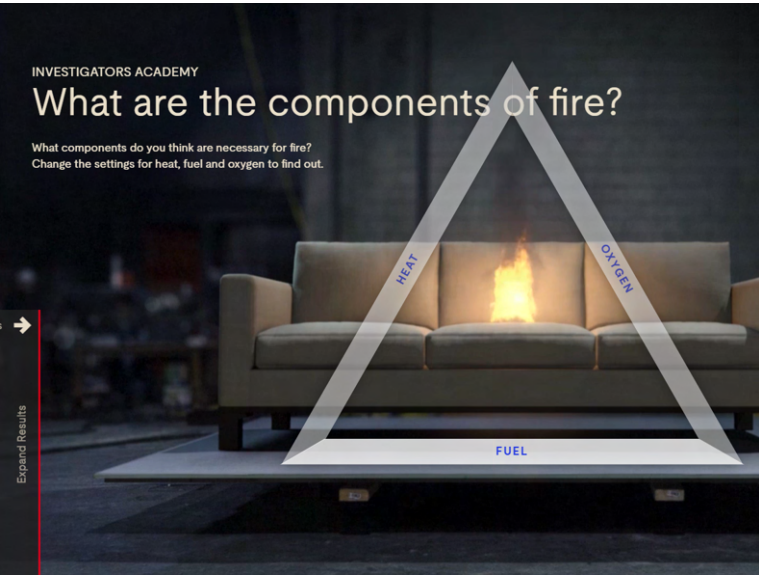
During this discussion, one student said, "I never thought about how we would get out if there was a fire at night." That comment was powerful because it showed that the lesson had moved beyond academic learning into real-life awareness.

What made this learning experience particularly unique in my classroom was the strong ESOL context in which it was implemented. Many of my students are multilingual learners who are

simultaneously developing academic English while mastering complex scientific ideas, so implementing these lessons requires intentional differentiation so all students can participate.

Supporting multilingual learners in science and safety

To support my ESOL students, I incorporated multiple language scaffolds throughout the lesson. Visual supports played a key role. Diagrams of the fire triangle, images showing heat transfer, and labeled visuals helped students make connections between vocabulary and scientific phenomena. Sentence frames were also essential. Students were provided with structured language such as “I think the fire started because … ” or “The evidence shows … ” and “Heat moved by … ” to frame their discussions — giving them the confidence to communicate their thinking while practicing academic language.



Collaborative learning structures were another important adaptation. Students worked in pairs and small groups so they could discuss their ideas, build explanations together, and clarify their thinking through conversation. This peer interaction helped multilingual learners process new vocabulary and concepts in a supportive environment. By hearing and using academic language in context, students were able to strengthen both their scientific reasoning and their communication skills. Hands-on investigation also served as an equalizer for students at different language proficiency levels. This approach allowed students to demonstrate understanding through visuals, diagrams, and explanations rather than relying solely on written language.

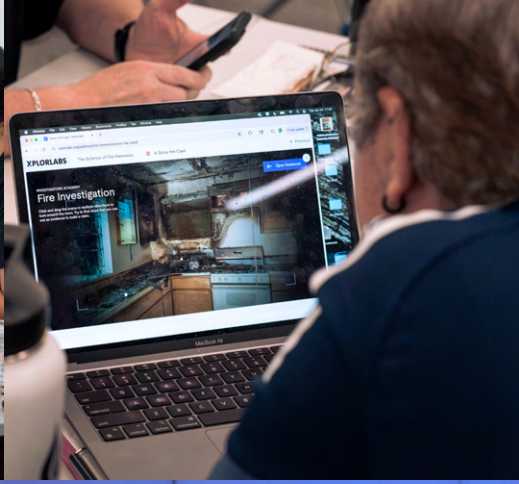
Through this experience, I realized that inquiry-based science and language development can work powerfully together when lessons are intentionally designed. When students investigate real problems, they naturally use language to question, explain, and justify their thinking. The fellowship reinforced for me that differentiation does not mean simplifying science. Instead, it means providing multiple pathways for students to access and demonstrate understanding. With the right supports in place, multilingual learners can fully participate in rigorous STEM investigations and contribute valuable perspectives to the learning process. Some of the most meaningful moments during this lesson came not from my instruction, but from student conversations and discoveries.

Next steps for educators

For educators reading this story, my call to action is to embrace real-world investigation and design learning experiences that connect science content to issues that matter in students’ lives.

Start by looking at your standards and asking yourself how they might connect to authentic situations students could encounter in their homes or communities. When students see how science explains real-world problems, their engagement and curiosity increases dramatically. I would also encourage educators to intentionally design lessons that support diverse learners. Differentiation and adaptation are essential for ensuring that all students, including multilingual learners, can access complex STEM concepts. Visual supports, sentence frames, collaborative discussion, and hands-on investigations can make rigorous science both accessible and empowering. ■





XPLORLABS
Fire Investigation


Lunch and Learn
Dr. Chris Callison-Burch
Professor of Computer and Information Science
June 24, 2025


Annual Research Symposium
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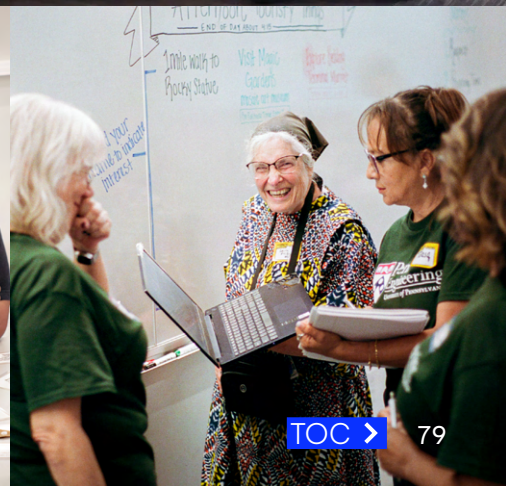

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