



Lightning Strikes!

A Gift that Forged Youth Futures

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Foreword by Jane Werner, Executive Director,
Children's Museum of Pittsburgh

When we envisioned MuseumLab back in 2016, we saw it as a place to experiment with ideas about how kids learn. We saw it as a place to take risks and bring people together to talk, create, learn and do things with and for youth—and maybe even challenge our own assumptions of what students could do.

Ten years and a pandemic later, our vision is a reality.

The Fusion Project, funded by Arconic Foundation, was exactly what we hoped for: deep engagement by youth in activities that they would never experience in their classrooms. This encourages them to take risks, see possibilities and create something of their own.

We learned a lot too. We learned how to work and partner with youth. We learned how to integrate the creative process into curricula. And we learned a lot about metalworking!

Thanks to Arconic Foundation, we have a platform to pursue ideas at MuseumLab that we only dreamed of when we first started. With Arconic Foundation's help, we sincerely believe we've begun to change people's lives.



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MuseumLab is a place unlike any other. Andrew Carnegie commissioned the landmark building as the first free library in the United States, and it operated as a public library for more than a century. In April 2006, lightning struck the library's tower, causing a three-ton chunk of granite to crash through the roof, crushing a baby grand piano. Eventually the library moved to a new location and the striking building sat unused for more than a decade.

In 2019, Children's Museum of Pittsburgh and a coalition of partners—Manchester Academic Charter School, SLB Radio Productions, Allies for Children, Carnegie Mellon and the University of Pittsburgh—opened MuseumLab, a reimagined facility that revived the former library building. Designed by the award-winning Koning Eizenberg Architecture, MuseumLab is now a "beautiful ruin" that reveals and celebrates history while reimagining a space where the future will take shape.

The building offers hands-on learning experiences in tech, media, the arts and making, specifically for older youth. Through collaborative programming, MuseumLab has become an innovative and inclusive learning space to experiment with new ideas that span formal and informal education. As a universally designed building that meets LEED Gold standards, MuseumLab has been honored with numerous awards for design and sustainability—but above all, it is a space for young people to grow and dream.

Along with programmatic partners, the Museum sought relationships with visionary supporters who understood the potential of this new laboratory for learning. Arconic Foundation, which partners with nonprofit and community organizations to enhance education through skill-building learning experiences, emerged as a key supporter to launch an ambitious new educational pro-

gram at MuseumLab. From 2020 to 2025, they invested \$1 million in MuseumLab to present the Fusion Program, a bold initiative to bring metalworking education to middle school youth in Pittsburgh and beyond. Their transformative gift enabled the Museum to develop a leading youth metalworking facility, invest in professional development for staff, and deliver hands-on STEAM learning programs to thousands of young people.

The Fusion Program partnered with Pittsburgh Public Schools (PPS), an urban district of nearly 20,000 students, nearly two-thirds of whom are economically disadvantaged. Over the course of five years, Fusion gave every PPS fifth grader the chance to visit MuseumLab for a hands-on metalworking experience, unlike anything else in the city. An extensive range of metal arts workshops, intensive camps and out-of-school time programs extended the learning even further. Across the five-year grant, Museum staff had the opportunity to prototype, evaluate and improve experiences, making them increasingly more accessible, engaging and relevant. Fusion provided powerful opportunities for students to try new things, take real risks, build agency through making and nurture their creative curiosity.

The results have been transformational. Investments in a uniquely accessible youth metalworking shop, extensive professional development and deepened partnerships laid the foundation for an explosion of impactful programming at MuseumLab and beyond. From independent residencies for young metal artists to outreach kits that brought STEAM learning to rural libraries, the Fusion Program blossomed and reached thousands of community members in unexpected ways. This report shares some of the magic of the program, its experimentation and growth, and the ways it will continue to forge youth futures for years to come.

“ It was a really big piece for me personally. [The Museum educators] were there to help any time you had questions, any time you needed help ... but if you wanted to just blunt force, like, “I don't know if this is going to work,” then they were very much like, “Go for it!”

—Middle school metalworker







Part 1

Laying the Support Beams for Lasting Youth Engagement

This wasn't just a flash in the pan. MuseumLab used support from Arconic Foundation to invest in three areas that will benefit local youth for years to come: the building, staff and partnerships.

Investing in a Space: Equipping MuseumLab as Pittsburgh's Premier Metal Shop for Middle School Youth

Libraries are known as spaces of quiet respite, but in this library building, you're more likely to need ear protection. It turns out, the simultaneous hammering of 20 middle school students registers at an impressively high decibel level.

Our advanced makerspace, MakeLab, was outfitted with state-of-the-art tools to enable students to cut, shape, melt, bend and transform metals using a variety of techniques. While many metal shops are equipped with one workstation for a single craftsman to work, the goal in MuseumLab was to engage a full class of student makers at once. That meant acquiring many sets of tools: dozens of hammers, hundreds of metal stamps, pliers, and files, piles of metal, and backup supplies for when tools inevitably broke under the strain of middle school bravado.

Other equipment in MakeLab is single-use to keep kids safe around hot or dangerous tools. For example, staff oversee the high-temperature enameling kiln where young people fuse glossy designs and the adjustable benchtop ventilation system that arches overhead like a giant diplodocus neck. But just because students cannot physically use this equipment all at once does not mean they are left out of the process. An elevated camera magnifies and projects the action on a large screen in the room, allowing the whole group to share the experience. The historic building is part of the magic as well. Students marvel at the original exposed beams made of Carnegie steel—a perfect invitation for

educators to draw interdisciplinary connections to Pittsburgh's history. An original tile mosaic on the floor hints at the building's past as a public library and offers a sense of possibility as students cross the building's threshold. If this quiet and austere space for books can be reimaged as a vibrant makerspace, what might a young person dream up and create from recycled scrap metal?

MuseumLab is the only metal shop in Pittsburgh that's designed specifically for middle school youth, especially those visiting in large groups. That intention shaped every decision—from the number, scale and type of tools to the flow and flexibility of the room. To embrace the diversity of learners' needs and ensure more people can participate fully and joyfully, MuseumLab places Universal Design principles at the heart of its design decisions. This philosophy anticipates and welcomes human variation, with the goal of creating an accessible and inclusive environment where people of all abilities can learn and thrive. From flexible workstations and adjustable lighting to intuitive wayfinding and clear visual communication, MuseumLab exemplifies human-centered design.

While there are other places in Pittsburgh where youth can learn to work with metal, none were built from the start with this scale, intentionality, and purpose. MuseumLab is a welcoming, high-capacity, youth-first metal-working studio that honors history while inviting groups to explore, learn and express their creativity.

“The tools and techniques in the metal lab are like nothing I’ve seen for students in this age range.”

—Middle School Teacher



Investing in People: Cultivating the Context for Staff to Innovate

After the school bus carries away the morning's field trip group, MuseumLab grows quiet. A group of Museum staff gather around a table in MakeLab. One reads from an article on a laptop. Others hover over basins of liquids, surrounded by wires. Their goal: attempting electro etching, a process that combines art and an oxidation-reduction chemical reaction. The article makes the process seem so cool. But it's also time intensive, which may be prohibitive for tight field trip schedules. *Can staff figure out a way to invite youth into the process?*

Typically, electro-etching involves creating a design on a piece of metal using a resistant material, attaching the piece to a power source, and submerging the metal in a copper nitrate bath. Turn on the power, and a flow of electrons removes a thin layer of copper from the surface, except for the areas covered in the resistant material. Turn off the power, rinse the metal to stop the reaction, clean off the masking material and reveal the design, which remains shiny against the newly matte background.

Suddenly, one of the staff members finds a video that suggests that you can use a metal basin both to hold the electrolyte solution and to act as the cathode in the chemical reaction. It works, making it possible to complete an electro etching in less than 30 seconds when it typically takes more than three minutes. That's a timeline that can work for a field trip group.

Giving staff time to experiment with metalworking techniques might seem simple but it's surprisingly revolutionary. The grant from the Arconic Foundation allowed

Museum staff to engage in dreaming and tinkering. Lots of things didn't work, but that was a natural and necessary phase of standing up a whole new medium in the Museum's repertoire. Staff learned together and shared their discoveries, fostering a community of experimentation, encouragement, and excitement. While some had metalworking experience, most did not. "It was a lot of unfamiliar territory," one staff member recalled.

In addition to staff exploration and co-learning, the metalworking program was able to access external expertise and formal professional development. Sharon Massey, a metalsmith and enamelist from Indiana University of Pennsylvania, came to the Museum and led a staff workshop about enameling. Guest artists not only led workshops with visitors but also taught their craft to staff. Museum educators took metalworking classes online and off-campus. At conferences, through readings and in interactive workshops, staff learned the latest research about accessible practices, culturally relevant education, interpersonal interactions, youth development and more. The Museum even hosted an improvisation session to help educators think on their feet and turn unexpected challenges into moments for learning and joyful growth.

Ultimately, the Museum's approach to staff development mirrored its approach to youth development: believe that each person has creative genius within them. Give them time, space and materials to explore in community with one another. Then sit back and watch the sparks fly.

“ If I was in middle school,
I would tell myself to figure
it out. So I'll figure it out.”

—Museum educator



Investing in Relationships: Nurturing Partnerships with Teachers and Schools

Don't try this at home (instead, come do it at MuseumLab!): Take a small wooden box. Pack it two-thirds full of kinetic sand. Make an indentation by pressing an object into the sand. Then pour molten metal (heated to approximately 460 degrees F) into the indentation.

Over the last five years, hundreds of people have used this process to make pewter castings in MuseumLab. We've seen countless dominoes, animals and letters cast in pewter. But only one human foot.

The Fusion Program was designed in collaboration with Pittsburgh Public Schools (PPS). Like many urban school districts, PPS faces tremendous challenges. Declining student enrollment, aging infrastructure, budget shortfalls, mandatory testing, and the disruptive impacts of the pandemic have contributed to a crisis of dwindling resources and competing priorities. In this environment, enrichment opportunities like art programs and field trips are often cut. In a conversation with program evaluators, one teacher shared, "We only get to come because the grant pays for the bus."

Despite the challenges of delivering this program, the benefits are substantial. The outcomes of a MuseumLab visit are so widespread and meaningful that Christen Robl, PPS Coordinator of Visual and Media Arts, and Nina Unitas, PPS Senior Program Officer of Arts Education, restructured the District's curriculum to prioritize art field trips—promising that the effects of this project will continue for years to come.

The partnership with PPS enabled the Museum to reach thousands of students, giving the program incredible breadth. Other partnerships were about depth. For example, the Environmental Charter Schools' Quest Lab program brought a cohort of 10 eighth-grade students to MuseumLab over multiple sessions as part of their capstone project. The focus was on recycling and systems—highly aligned with the Museum's and Arconic Foundation's values around sustainability. Educators were able to tailor learners' experiences based on their individual interests: students created pewter sculptures, wire keychains and even prints made using etched copper plates.

Professional development further strengthened the project's impact on teachers, schools and ultimately students. One example was the Museum's *Genius, Joy and Love* program, which offers intergenerational learning for teachers and students on how to be changemakers in their communities. As part of the program, facilitators invited participants to memorialize a symbol of their values by creating metal castings that continue to fuel their work transforming schools. The Museum would not have had the expertise, tools or facility to offer this activity if it were not for the gift from Arconic Foundation. Christen from PPS participated in the *Genius, Joy and Love* program. That pewter casting of a human foot we mentioned earlier? It was from Christen's new baby, who attended with her. From infants to youth to educational administrators, this project has shown how metal can connect us to one another, our values and our futures.

Right: Pittsburgh Public Schools arts administrators Christen Robl, left, and Nina Unitas work to create a mold of Robl's baby's foot, to create a pewter cast.

“ They’re given an opportunity to use something that I could never afford to ever have at school... it’s an opportunity they would never get otherwise.”

—Middle School Teacher







Part 2

Defining Characteristics

Young people can do incredible things. Stemming from that core tenet, three things that distinguish MuseumLab's work are open-ended experiences, a novel twist on relevance, and a tolerance for risk.

Unscripted Exploration: Leading with Open-Ended Curiosity

Teeny tiny purse.
Friendship pumpkins. Robot dudes.
Homeland memories.

You can feel the lively buzz when you enter the room. Twenty middle school students gather around tables piled with recycled aluminum cans. Their task? Make anything (as long as it's family friendly).

On the surface the activity looks simple: give youth cans and sturdy scissors and see what happens. In fact, this workshop is the product of a years-long pedagogical design process of experimenting, evaluating and refining an approach to open-ended learning, skill development and expression.

In the first attempts to engage a field trip of youth with an activity using recycled cans, kids contributed to a giant, collaborative metal collage. An educator sketched a design on a plywood sheet. Budding makers traced elements of the design, cut metal pieces precisely and hammered them onto the plywood. With collaboration and persistence, the plywood transformed into a glinting metal art piece depicting scenes such as a garden, the Pittsburgh skyline and a mountainscape.

Students engaged with metal, it was fun and the final product was beautiful. But we wanted to see more creativity and curiosity. So, we iterated. In the next version, each student received their own wooden backing and freedom to create a personalized collage. It was better—we definitely saw more creativity—but we didn't stop there. The staff

wondered, "What happens if we go three-dimensional?" Soon students were not just cutting but bending, twisting and testing new methods of attachment. They explored scale, designing miniature trinkets. They made gifts. International students created flags to showcase their heritage. Each project became an opening for educators to get to know students and connect the learning to their interests.

STEM learning can be highly regimented: think of following careful lab procedures. In MuseumLab, students learn materials science and engineering in service to curiosity and self-expression. It may not even feel like learning. One participant shared, "For a minute, I forgot why we were here. You know what I mean? We were just having fun." Another expressed, "I love [when educators] kind of guide us a little bit, but I also like that ability to be creative and to expand on our thinking."

This open-ended approach was particularly uncommon during the pandemic, when keeping a class of students focused on a screen often necessitated clear, step-by-step instructions. After returning to in-person learning, "What do I do next?" became a common refrain. This workshop showed us the lasting value of turning students' questions back to them: "What do you think you should do next?" In MuseumLab, metal isn't just a STEM or art material. It's an invitation to learning that doesn't feel like learning, to creativity and to curiosity.

“ There has to be some structure, but there has to be a point where you say, you have to figure this out. In real life, that’s what they have to do.”

—Middle School Teacher



A New Spin on Relevance: Forming Connections and Inspiring Lasting Memories

The sign on the door says today's workshop is about metal embossing. So why are there pictures of SpongeBob and Groot around the room? Why are there sponges and pieces of tree bark on the tables?

The Fusion Program brought many students to MuseumLab who don't typically visit museums. This includes youth from low-income families and immigrant and refugee students whose home countries may not have children's museums. One teacher shared, "For our kids, this is a totally new experience. They don't get this at home."

Research shows the importance of grounding lessons in things students know and care about, especially for youth who are new to an educational setting. That's where SpongeBob comes in. Embossing is about adding texture to metal. Thinking about cartoon and comic book characters helped students immediately connect with the concept of visual texture. Museum educators found that asking, "What do you see that tells you SpongeBob is a sponge?" lit up the room much more than abstract descriptions or examples. The tactile sponges and bark on the table further extended the connections—students moved from imagining a character's texture to touching real-world examples to embossing pieces of metal that show the character's essence. And if you can do that, you can use embossing tools and techniques in nearly unlimited ways.

MuseumLab educators also build relevance by empowering students as part of Pittsburgh's history. Pittsburgh was once the heart of the global steel industry and metal remains a hallmark of the city's identity. At MuseumLab, students become an active part of extending that history.

Whether through local connections or viral memes, this relevance can elevate learning for many students who may not always thrive in the classroom. "Kids that are kind of quiet in other aspects shine on the field trip," noted one teacher. Another teacher recalled a struggling student who received buoying encouragement on a visit: "This person traditionally has not had a lot of praise...[the field trip] had a positive effect on them. I was like, yes—let's ride that wave all the way back on the bus."

This work relates to education scholars' research-based frameworks for Culturally Relevant, Responsive, and Sustaining Education. But relevance isn't our whole story: we posit that when culturally-connected learning is infused with the novelty of the Museum context, something uniquely powerful happens. With relevance fostering a sense of comfort, safety and belonging that lays the foundation for learning, novelty and its related emotions of awe and wonder open neural pathways for forming lasting memories. A teacher described how the experience shifts students' whole orientation towards education: "Just exposing the kids to a non-traditional learning environment allows them to feel reinvigorated about learning."

“ This is an opportunity to see into the minds of our students who don't wear their brilliance on their sleeves.”

—Teacher who visited on a field trip



Band-Aids and Breakthroughs: Trusting Youth to Navigate Risk

Welcome to MuseumLab, where you can:

Cut yourself on sharp metal

Hammer your thumb

Burn your hand on hot tools

Poke your fingertips with wire

Crush yourself with a press

Get electrocuted

And surprise grown-ups with how responsible you can be: Finally trusted, finally free.

Metalworking hasn't traditionally been available to youth because of the inherent risk of working with sharp, hot and heavy materials. But the Fusion Program helps middle schoolers safely navigate risk. Trusting youth to take on these responsibilities can offer tremendous rewards such as confidence, agency and empowerment. Danielle Linzer, the Museum's Senior Director of Education, Learning and Research recalls observing a Fusion field trip on her first week on the job. She laughs, "I've never seen so many band-aids given out in a museum program! I was amazed at the level of risk, but also at how kids just kept going."

For Sarah La Rue, Senior Manager of MuseumLab, this approach stems from her childhood and the way her parents would explain why they told her "no" or cautioned her to be careful. She brings this same strategy to the Fusion Program: "We do a lot of calmly but steadily saying what the dangers are." Staff also draw on real-world examples, explaining that something might sting like a papercut or that a metal's melting point is about as hot as a home oven. "They know how hot an oven gets," La Rue explains, "So then they're careful."

When staff introduce risks in this way, youth rise to the challenge. Countless times, we've heard adults doubt whether certain students can participate. Teachers whisper, "Are we really going to give a hammer to *that kid*?" Then those students show remarkable care and create something extraordinary, thrilled to be trusted. Seeing teachers' reactions is priceless. Museum educators don't know kids' backgrounds: they approach each young person as capable, creative and worthy. Helping teachers see their students in a different light can have powerful impacts even after the field trip ends.

Most youth are eager to use real tools and practice real processes that are typically restricted to older makers. For others, the transparent communication about risk gives them the chance to assess and self-regulate. One student might quietly share concern that their hands may not be steady enough, asking for hand-over-hand assistance when pouring molten metal. Another might focus intensely for a while and then take a break, returning to the process when ready. A teacher recalls a student who was "anxious about everything," but who felt safe enough to try at her own pace. To the teacher's surprise, "Then she did it and realized she could. That confidence is huge." We invite and celebrate this self-advocacy, encouraging young people to curate their own experience.

Risk is a natural part of life and learning to navigate it responsibly is an important part of growing up. At MuseumLab, this is a cornerstone of our programming.

“ We love danger...when you have that risk, it necessitates a level of focus.”

—Rebecca Grabman, Manager of Maker Education





Part 3

Program Highlights

Since 2020, MuseumLab and Children's Museum of Pittsburgh's metalworking activities have expanded exponentially. Field trips provided a test bed for innovation. Other experiences immersed students in deep, ongoing learning and brought metal to new audiences, both near and far.



Left: Guest artists from Rivers of Steel pour molten aluminum into molds during Fusion Fest, November 2025.

Arconic Fusion Field Trips: A Space for Innovation

“Amazing.” “Awesome.” “Excellent.” “Fun.”

Those were the most common words attendees used to describe their Fusion field trips. Teachers added “academic” and “educational,” “welcomed” and “wonderful,” “hands-on” and “engaging,” and “ideal.” Museum educators called these field trips their superpower.

Every Fusion field trip involved consistent elements. The anchor was a one-hour metalworking workshop in MakeLab. Some groups cast molten pewter, others etched designs in copper with electricity, some crafted three-dimensional metal sculptures, and others used stamps, embossing tools and presses to transform and texturize metal surfaces. Each activity revolved around real tools, real risk and real opportunities for creativity. Supplementing the metal workshop, youth explored the building on an art walk that braided Pittsburgh’s industrial history with contemporary art. Students climbed, crawled and marveled in Gymlacium, a three-story immersive art piece woven into the steel grid of the former library stacks. In TechLab, youth pressed personalized license plates: take-home mementos of their trip and expressions of their interests and identities.

The Fusion field trip program was a boon for educational innovation. Student groups visited daily during the busy parts of the year, providing a robust sample size for comparing different approaches. Through a process of iterative design and reflection, the Museum team refined nearly every part of the field trips. Adjustments to the schedule made

things run more smoothly. Changes to the core workshop activities made them more creative, relevant and pleasant (too much hammering leads to headaches!). We learned that some activities worked better as short drop-in programming; others, we expanded into longer camps and residencies. When staff changed the way they introduced Gymlacium, rough-housing transformed into focused wonder. Students began making comments like, “I want to learn how to do that so I can make one in my backyard” or, upon learning about the duration of construction, “Two years?! I could never do a project for two years!”

Teachers noticed. Several said the Fusion field trip was the best one they’d taken. Many praised the trip’s educational value, with one sharing that it was a “great cross-curricular field trip...It promotes hands-on learning and combines science with art. 10/10 would recommend.” Others appreciated the trip’s workforce connections. “These are real life skills and possible careers!” shared one teacher, while another valued the interactions with Museum educators, saying “It matters” that “kids can see themselves through [educators’] eyes” and recognize that “you’re not that much older than me.”

In a city built on steel, students came to MuseumLab and shaped metal with their own hands. They tested tools, asked questions, climbed inside art and imagined what they might make next. By the end of the Arconic grant term, the Fusion field trip program was a polished, well-oiled machine: powered by innovation and creativity with a lasting metal foundation.

**“ This building is your creative canvas.
Think beyond the surface and try new things.
Find your favorite activities and fearlessly
approach the most unfamiliar activities.”**

—A teacher's words to a student about a Fusion field trip



Camps, Workshops and Residencies: Fostering Deep Engagement

One student carefully weaves wire. Another bends over an ornate jewelry piece modeled after a monarch butterfly. A third is making a vehicle with moving parts. In the corner, an educator works one-on-one with a student perfecting their technique with a torch.

Whereas the Fusion field trip program was engaging large numbers of students in a condensed time period, the Museum's metal camps, workshops and residencies thrived on small groups and long relationships. From the outset, the goal of these intensive experiences was to build kids' skills so that by the end of the program, they would be ready to confidently navigate the studio independently.

Programs began by introducing new tools and techniques. "You don't have to like it, but you have to try it," educators would say. Over time, staff began encouraging youth to brainstorm their own ideas and imagine how they could use their new skillsets to realize them. By the end, educators were no longer leading; they were supporting kids' dreams. Staff described it as the best feeling they'd ever had at work.

On weekends, MuseumLab offers youth workshops that explore in-depth metal-working techniques, such as discovering what's possible with a jewelry saw, a die-cut punch, or a flexible-shaft drill. And in the Museum's afterschool program and mlabPASS youth membership, middle school students enjoy access to the Museum's metal

shop and small group instruction during out-of-school time hours.

In the summers, support from Arconic Foundation allowed the Museum to award scholarship spots for week-long intensive metalworking camps each year. Numerous students returned for multiple sessions, expanding their skills and interests. Camps ranged from focused investigations of a single technique such as enameling, to broad introductions of metalworking approaches. Educators explored the developmental arc of metalworking, learning what was appealing and how to find the sweet spot of difficulty, challenge and reward for each age group.

Youth artist residencies offered deep enrichment for students with metalworking experience—whether at MuseumLab or elsewhere. In these programs, youth benefited from one-on-one support from expert mentors, which one student described as "outstanding." The personalized guidance allowed youth makers to elevate their art. One resident shared, "It allowed me to start taking on more ambitious projects. This is exponentially more difficult than anything I made before."

Whether metalworking is a passing interest or becomes a hobby or career, youth leave these programs with lasting confidence and self-knowledge: I can try hard things, I can improve my skills with practice, I have great ideas, and I can make my ideas into real-world works of art.

Right: A camper sports the horned medieval-inspired helmet he created from foil during a week of summer camp.

**“I really feel like this has been a
fundamental change in my art process.”**

—Residency Participant



Fusion Fest: Convening Pittsburgh's Metal Talent

Metal is everywhere in Pittsburgh. Fusion Fest was a way to highlight the places, practices, and people who make that possible. For one weekend each year, MuseumLab provided a full slate of metalworking activities and metal art on display at this annual public event. Fusion Fest showcased the finest of what the Museum had learned about how to make metalworking accessible for children and families, giving thousands of people the chance to try it in different forms. One highlight was the grand opening of the Youth Metal Arts Showcase, a celebration of what young people can make with metal. Guest artists and local organizations complemented the Museum's offerings. During the final Fusion Fest in November 2025, Industrial Arts Workshop sent sparks flying with free welding lessons and Rivers of Steel fascinated viewers with a bold, enticing presentation of aluminum pouring—a more industrial version of the pewter casting that visitors could try for themselves inside MuseumLab.

Metals Showcase: Celebrating Youth Metalworking

Few people would guess that the artists who created the exquisite pieces in MuseumLab's Youth Metal Arts Showcase were so young. Artists from Kindergarten through 12th grade submitted work for consideration, including everything from delicate enameled jewelry to massive welded sculptures that required specialized crate shipping. But all were truly impressive. To reward the meticulous technique involved in creating the pieces and continue fueling the young artists' creativity, a jury of Museum staff presented prizes such as private workshops, open studio time at MuseumLab and gift certificates to a metal supplier. Over the program's five years, excitement surrounding the annual exhibition grew. Teachers began to embed the submission opportunity as part of their curricula, and young metal artists leveled up their skills and looked forward to opportunities to share their work publicly. During Fusion field trips, art walk guides made sure to pause and highlight the work to inspire the next generation of makers.



Metal Outreach: Expanding Metal Access for Pittsburgh's Young People

MuseumLab offers an unparalleled metal shop for middle school groups, but not everyone can or wants to visit in person. Teona Ringgold, Director of Culture and Community Impact, and Angelica Miller, Manager of Accessibility and Community Engagement, are driven to connect with communities by taking accessible programming beyond the Museum's walls and into schools, community centers, afterschool programs and other settings. Thanks to funding from Remake Learning, students at Pioneer Education Center and Pressley Ridge's School for the Deaf and School for Autism enjoyed embossing workshops. A collaboration with Mayor Ed Gainey's Office for Civic Learning allowed the team to introduce metalworking to a predominantly Black group of high school students. Young children at Manchester Youth Development Center's afterschool program made embossed metal holiday cards to celebrate the winter holidays.

Library Connections: Equipping Librarians to Share Metal Far and Wide

Building from the success of the Fusion Program, Children's Museum of Pittsburgh worked with rural libraries in Greene and Washington Counties to promote metalworking in their communities. First, the Museum created bins full of tools and materials for metal projects: soldering, can art, embossing, jewelry making and more. Then, the Museum's professional development team and Fusion educators paired up to develop a train-the-trainer workshop that taught librarians not only how to do the activities but how to lead them with library patrons. The Museum team drove to the libraries and delivered the workshop in the morning. In the afternoon, the librarians led public workshops—with the Museum staff there to clarify and support as needed. After the workshop, the bins became part of the libraries' inventory—available for patrons to check out and use at any time. This work, which extended the impact of Arconic Foundation's investment, was made possible by the EQT Foundation.

Images, left to right: Young visitors welding with staff from Industrial Arts Workshop during Fusion Fest; Student artwork on display in MuseumLab, 2025; A student wears protective equipment when preparing to work with metal; A staff member at Sewickley Township Public Library hones her soldering skills.





Part 4

The Results of MuseumLab's Metal Program

The project created resounding positive impacts on youth and professional educators, artists, and partners—as highlighted below and described on the upcoming pages.

5,368
students visited
on Fusion field trips

83%
of field trip
participants
reported
taking a risk

99%
of educators
felt the field trips
were enjoyable,
educational and
welcoming

12
hammers broken
by enthusiasm

441
pounds of
pewter
melted

500+
feet of aluminum
flashing made into
mini license plates

Left: Youth Night participants create custom mini license plates from aluminum flashing.

Finding Home, Solidifying a Future

The program was really amazing. Basically they were like, 'Here are some materials. Here's a jewelry space. Do whatever you want.'

Meet Finn. He's a student at Allerdice High School in Pittsburgh and a graduate of MuseumLab's artist residency program. When he moved to Pittsburgh, he wanted creative outlets. His teacher recommended the residency. Through it, Finn met new people, expanded his skills and solidified his career interests.

Finn thrived on the program's freedom. "It gave me an opportunity to not have any guidelines, not have any requirements to what I had to make or what I had to do," he shared. This stood in contrast to his previous classes, where students followed set processes to create predetermined products. MuseumLab offered a refreshing, new style of learning: "I could kind of self-teach and test the limits of what I knew how to do."

Most people try to avoid failure. Finn embraced it. He recalls that the Museum educators "wanted you to make mistakes to learn from it," which Finn found "really beneficial." This comfort with mistakes was facilitated by open access to tools and material that, in Finn's past experiences, had been limited. "I am sometimes a very chaotic designer," he explained, "so it was very nice to be able to let my pieces be more chaotic, be more creative, be more wild by having access to basically unlimited resources."

The residency allowed Finn to build relationships in a safe space. "We had a lot of in-depth conversation," he recounts, "it was just a very chill, relaxed environment to be in." MuseumLab became a place where Finn felt "safe to, like, be myself." As a trans, queer, and autistic person, that's not something he could always take for granted. Finn said, "The inclusivity aspect of it--that was really great." Participants formed meaningful bonds—whether based on common aspects of identity or shared creative interests. Finn valued the collaborative culture: "It was really nice while I was in the drawing phases to go up to people and be like, hey, what do you think of this?" He's still in touch with other residency participants today.

Another lasting impact is Finn's trajectory with metal. Following the residency, Finn continued making metal pieces. He's taken additional metal courses. And he's even helped teach jewelry making to others. Now Finn sees metal as a core part of his long-term plans—and he credits the residency with helping him clarify his way forward:

I am planning on doing a dual career. And part of that is being a jeweler. Specifically, creative, fun, custom pieces... When I did this program, I had not decided that that was going to be my career path yet...being in that program and having that freedom and creativity to really see what I can do with metal...helped me make that decision."

“ It gave me an opportunity to not have any guidelines, not have any requirements to what I had to make or what I had to do.”



Manchester Academic Charter School: Partnering to Build Youth Confidence with Serious Stuff

Most of the youth who participated in MuseumLab's metal program arrived on buses. Some came on foot or by car. But students from Manchester Academic Charter School (MACS) simply walked down the stairs.

MACS' middle school shares the historic library building with MuseumLab and the two organizations' ongoing collaboration has taken many forms. Museum staff and teachers have co-planned units, Museum educators have led activities to help students de-stress during standardized testing, and staff have participated in professional development exchanges and skill shares. One of the most impactful and ongoing forms of partnership happens in elective classes: when academic courses end each day, students stomp down the stairs to enjoy choice-based classes taught by Museum educators, focused on art, making and more.

The maker elective fully embraced metalworking. "There was something about metal that got kids to just focus," recalled Alejo Barandiaran, one of the elective instructors. Barandiaran believed the seriousness of metal made it appealing for young people:

We're doing it with a torch, we're doing it with an electric drill. You just can't open a jump ring wall with your fingers—you have to use tools on it... [youth think], 'Adults are taking me seriously and so I'm going to take this seriously.' That just clicks for them and they will make really cool things.

In the elective, middle school students tried stamping, pewter casting, electro-etching, intaglio printing and more. They made keychains for backpacks, enamel necklaces, stained glass pieces—anything they could imagine. At one point they made pewter castings. Then just for fun, they repeated the casting process with chocolate instead of metal. It was every bit as messy as it was delicious.

But more important than the products the youth made was the confidence they developed. Early in the semester, hesitation was common. Seeing a saw or a hot tool, students would say, "I can't touch that. I'm in middle school!" Museum instructors would reply, "Yeah, that's why I think you should be able to do it." By the end of the year, students were using the tools fluently and without fear. One time, multiple students' saw blades broke at nearly the same time. Typically the educator would help replace the blades but he couldn't do them all at once. Not wanting to waste time waiting, students just started fixing the saws themselves—they'd learned how, and they all did it safely.

At eighth grade graduation, the two student speakers had both been in the maker elective. Each highlighted the elective as one of the most meaningful parts of their middle school experience. They shared what they appreciated about the experience: the independence, creativity, and confidence that came from being trusted to work with real, "weird and scary" tools and materials in MakeLab. MACS values these outcomes, too. Over time, they have asked the Museum to expand its offering of electives so more students could benefit.

“ I want you to believe in your own agency and your ability to learn new things and your ability to tackle hard problems. And also I want you to keep all your fingers.”

—Wisdom from an elective teacher



Artist's Name Mrs. Hammond
Artwork Title Corn on the Cob
Date Created 10/1/20

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Mary's Story: The Heart behind the Art

If you've participated in metal programming at MuseumLab in the last five years, you've either worked directly with Mary or benefitted from their influence. Hired specifically for this initiative, Mary served as the Museum's resident metal expert—one of few staff members whose role centered on a single art form. Their involvement started with planning. "We essentially built up the whole program," Mary recalled; they worked with the education team to come up with the ideas for field trips, structure camps, scaffold learning and introduce new tools and equipment. And when the time came to lead the programs, Mary did that, too: "I taught everything. Almost every field trip...and every single camp that we ran."

Mary poured their creativity into the program, desiring to share their passion with a broad audience. "There's a lot of perception about who metalworking is and isn't for," Mary shared, "And I think we were able to really widen that within the scope of the program." This took multi-pronged effort: reducing financial barriers, facilitating physical accessibility, and communicating in ways that resonated with middle school students. Above all, Mary prioritized connection. That meant being flexible, letting go of rigid plans, and following students' interests, even when it challenged traditional approaches to arts education. "The ability to constantly think and rethink what I'm doing and be adaptive felt really important," Mary reflected. "I'd rather understand how to communicate and connect with someone than make them try to do something 'right.'"

For Mary, the program's highlights were repeated engagements that fostered

relationship-building and extended skill development. For instance, one summer camper returned for a second year already "knowing what she wanted to make and knowing what she needed to be supported." Building youth's skills to pursue their creative visions excited Mary, who said, "They know how to make things. They know how to go through the process." Describing magical moments when the hard work pays off and the educator's role shifts, they added, "[at that point] we're just here to get things out for people."

Mentoring others had a positive effect on Mary as well. After the final grant-supported school year concluded, Mary took a step they'd considered for a decade: pursuing an MFA in metal sculpture and becoming a professor. Reflecting on their time at the Museum, they shared:

I spent a lot of time with [metal], thinking about it and developing a relationship to it and thinking about my own self as a metal worker...But the biggest thing was, I felt more confident...I chose the program I did because of the teaching aspect. And I feel extremely confident in that because of this job.

The project continues to have a positive impact on Mary as they build and share their artistry with a new audience. Meanwhile, their influence remains deeply embedded in the Museum's metal program—and in the thousands of youth who discovered that metalworking could belong to them.

Right: Metals Mentor Mary shows a young artist how to use the flexible shaft drill during the first summer of metals camps in 2021.

“There’s a lot of perception about who metalworking is and isn’t for. And I think we were able to really widen that within the scope of the program.”

—Mary, Metals Mentor







Part 5

Launching the Future

The initial grant from the Arconic Foundation concluded in December 2025 but its legacy lives on through new projects and initiatives across the Museum, its partners, and the Pittsburgh arts ecosystem.

Accessible Pathways: Neurodiversity in Maker Education

The sound is turned down at MuseumLab today—and that's by design. The lights are lower, too. But the grins on people's faces are bigger than ever.

MuseumLab's sensory-friendly events gather families and kids who are neurodivergent or have disabilities to enjoy the space together in a relaxed environment. The building is always open to people with disabilities—in fact, it's the first Universal Design-certified museum in the world, meaning that accessibility was at the heart of decision-making when the building was designed, and it continues to be central to ongoing activities. The sensory-friendly events celebrate those choices and help us continue learning how to welcome disabled members of our community, including youth who are autistic or neurodivergent. They act as special invitations to be in community with other people "like you," where any stigma or pressure to mask your true self can simply melt away.

During this sensory friendly event, autistic teenagers are working with Museum educators as co-designers. Together, they lead and observe an activity, considering how to improve it for neurodivergent learners. An autistic teen introduces the engineering activity to a visiting family: using an array of found metal objects, visitors can create a free-standing balance sculpture, incorporating as many items as possible. The teen stands back to observe and support the activity, looking for ways to make the experience more accessible. Maybe the signage could be improved by simplifying the instructions and adding color-coded steps?

Perhaps the materials could be displayed differently in the room to make them easier to access?

The balance sculpture activity that's featured at this event was originally offered as part of Fusion field trips. Now, as part of an initiative supported by the National Science Foundation, the autistic youth co-designers have been working with Museum staff to recommend adaptations that make activities more inclusive for neurodivergent learners. The teen co-designers have revisited the balance sculpture activity repeatedly over the course of a year as part of an iterative design process.

Now, they are facilitating the activity with other neurodivergent kids to see if the changes support them to engage in the engineering design process—and to see if they foster a sense of belonging. Researchers at Education Development Center are compiling the learning from MuseumLab alongside experiences from other museums and developing a new framework for accessible maker education in museums.

Next up: The framework and learnings from the project will be shared with museum professionals all around the country through professional development, conference sessions, and a journal article. Back in Pittsburgh, the lessons are being integrated in the experiences we offer every day. What started with middle school metal-working in MuseumLab now expands across the Children's Museum's campus, to all ages and many mediums—whether metal, wood, fiber, or paper, however your brain and body work—you can be a maker here.

However your brain and body work, you can be a maker here.



BALANCE SCULPTURE

Work on a team to engineer a piece based on the following instructions to build a sculpture.

Balance sculptures are just one form of engineering work, so we have lots of other projects and lessons available to you. Visit our website at www.museumlab.org for more information.

Step One: Choose a platform to build your sculpture on.

Step Two: Make a plan. What parts will your sculpture have? What materials and tools of engineering might you need? How many should be the sculpture? How many should be the sculpture? How many should be the sculpture?

Step Three: Engineer your sculpture. How tall can you make it? How many different materials?

Copyright © 2014. Can you create an engineering sculpture? It's possible!

Thinking Routines: Facilitating Transitions from School to Play

Right this minute, are you feeling brave? Creative? Confident? We hope so, but let's face it: often the hustle and bustle of daily life leaves us feeling more ready for a nap than an intensive metal activity that could be dangerous if we're not careful. We think that's a sign of just how important it is to have creative outlets that break us out of the humdrum, but it can also be a challenge.

The Fusion Project has led to incredible results. And as always, the Museum wants to continue pushing boundaries. One of the things we noticed in our Fusion activities was that it often took youth some time to become comfortable with the types of experiences we were inviting them to try. The fact that these experiences were so radically different from school meant they could be transformational, but it also meant students weren't used to stretching themselves in those ways. In short programs, we found that we were losing precious time helping youth transition into the space and prepare for the activities. How could we speed up the process and maximize the opportunities for creativity, curiosity and play in a metalworking experience?

With support from the LEGO Foundation and the Association of Science and Technology Centers, the Museum is now experimenting with developing routines that help youth transition out of "school-mode" and into a playful learning mindset. Play

sounds simple, but as we age, we often deprioritize it. Our bodies and minds grow out of the habit, and our neural pathways for play can begin to fade. In middle school, being playful in front of peers can sometimes be seen as childish, eliciting social anxiety or awkwardness. But research compellingly shows that play is an important part of thriving for people of all ages; it fosters creativity, collaboration and joy!

As part of the LEGO Playful Learning Museum Network, MuseumLab will promote playfulness in several ways. First, staff professional development will build educators' knowledge about different types of play, how it can boost learning, and effective strategies for fostering play. Second, MuseumLab will experiment with how to make its physical space elicit play. We've heard youth say that sometimes the space feels too beautiful: it suggests that it's a place to look but not touch, a place where you have to be careful not to break anything. But what if the space communicated, this is a place for you to have fun! Along with these changes, educators for the elective courses with MACS students will be testing, evaluating and refining new routines to shift from "school brain" to "museum brain" at the beginning of class. Museum staff will continue to build on the approaches developed in the Fusion Program to strengthen opportunities for playful learning across the field.

Students will be testing, evaluating, and refining new, playful routines that help shift from "school brain" to "museum brain."



Arts Ecosystems: Strengthening the Wireframes of Pittsburgh's Creative Economy

Kids and families. Schools and artists. Fusion Fest exhibitors. Suppliers, community organizations, other museums, libraries—the list goes on. This project has served as a powerful convener, bringing people together across ages, identities and roles to form a youth metalworking ecosystem in Pittsburgh, with tentacles reaching across the country.

This capacity to connect people is one of the Museum's greatest strengths. In a 2019 study of the local arts ecosystem, researchers from the University of Pittsburgh identified Children's Museum of Pittsburgh as the organization with the strongest ecosystem centrality. In other words, it was the arts organization that came to mind for the most people when they thought about Pittsburgh's cultural landscape.

Others have taken notice of the Museum's prominent position as an arts connector. In 2025, The Heinz Endowments awarded a grant to MuseumLab to continue strengthening its ecosystem and to study the impacts of investing in the infrastructure of social connection. Three program areas will anchor this work. The first is a new approach to MuseumLab membership, including an adult Creatives Membership and mlabPASS, which invites middle-school youth to visit the Museum without an adult chaperone. Both memberships extend relationships and learnings from the Fusion Program through intergenerational learning, open studio access, workshops and special events. The grant will also expand the networks for Tough Art—the Museum's established residency program—and

MuseumLab for Museum Professionals, a professional learning initiative that promotes creative innovation across the museum field.

The building has gathered people for learning and discovery since it was first opened as a Carnegie free public library. In its current chapter as MuseumLab, Arconic's Fusion grant was the first major programmatic investment. The work described on the previous pages has only been possible through sustained engagement with our community, and the most impactful moments have often emerged from the deepest partnerships.

At times, our communities can feel fractured, pulled to different poles by conflicting views and beliefs. But the Fusion Program has allowed us to see how metalworking can bring people together. As a medium, it inspires imagination, rewards persistence and builds confidence. Ultimately, ecosystems matter because they foster the conditions where connection and innovation can flourish. Pittsburgh's industrial history once centered on metal. The Fusion Program at MuseumLab brought metal to today's youth. What comes tomorrow is still being shaped, but the wireframe is now in place: whether with metal or other materials, with middle school students or audiences of any age, our futures will thrive on open-ended invitations to imagine, supported opportunities for creative risk-taking, and safe spaces to forge new connections together.

Metalworking can bring people together. As a medium, it inspires imagination, rewards persistence, and builds confidence.





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A special thank you to our dedicated staff who work tirelessly to develop and deliver empowering programs for youth. And finally, thank you to all of the young people who took risks, shared their creativity with us and allowed us to learn how metalworking can be a tool to shape so many young futures.

Visit MuseumLab.org to learn more and find ways to get or stay involved.

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