

October 2022

GEORGIAPATHWAYS

M A G A Z I N E

Fixing The Skills Gap

Pets In The Classroom

Solar Fabrics For First Responders

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEAM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2000. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEAM education in Georgia.

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This magazine services the STEAM education industry needs of the state of Georgia. This magazine is viewed by the consumer with the understanding that the information presented is from various sources from which there can be no warranty or responsibility by the Technology Association of Georgia, the Technology Association of Georgia Education Collaborative and/or their affiliates as to legality, completeness or accuracy.

Manufacturing Skills Gap

PROPEL MANUFACTURING

The Frontier Of Nuclear Safety

SUMNER GIBBS / ORNL

Fabric Sun Power

THE SCIENCE AND TECHNOLOGY DIRECTORATE

Pets In The Classroom

MATT COFFINDAFFER

STEM Awareness Integration

WAYNE CARLEY

Welcome to the October 2022 issue of Georgia Pathways Magazine. October is Cybersecurity Awareness Month, which means that this is the perfect time to raise awareness about the endless opportunities and incredible demand for cybersecurity professionals, both in Georgia and beyond.

Georgia has had a strong presence in the cybersecurity industry from the very beginning - since before there were established techniques for protecting ourselves from online attacks. And today, Georgia remains a premier cybersecurity hub. The state continues to nurture the next generation of tech talent and support innovative startups and companies alike. There are currently over 150 companies that specialize in cybersecurity services in Metro Atlanta alone.

In large part, the booming success of Georgia's cybersecurity industry is due to its robust education pipeline. A national leader in the development of cyber research and talent, Georgia is home to twelve NSA National Centers of Academic Excellence in Cybersecurity. One of these is the Georgia Institute of Technology, where students, faculty and scientists can conduct cyber research in one of the university's 12 labs and cyber centers. In addition, Augusta University offers degree programs in areas such as advanced cyber defense and information security management. Others include the University of Georgia, Columbus State University, Georgia State University and more.

The cybersecurity industry is a dynamic one that is constantly evolving and, as such, new career opportunities are emerging almost daily. Common cybersecurity positions include cyber security analyst, cyber security architect, cyber security engineer and chief information security officer. The demand for cybersecurity professionals at all levels is extremely strong, and the stakes are high for Georgia's cybersecurity companies. And, one of the greatest advantages of the cybersecurity industry is that, because it is so broad,



it allows up-and-coming professionals to take their passion for security and find a niche sector in which they can hone in on their knowledge and skills.

The Technology Association of Georgia (TAG) and Tag-ED are committed to promoting information security at all levels. As such, TAG is the founding member of the National Technology Security Coalition (NTSC), which aims at uniting both public and private sector stakeholders around policies that improve national cybersecurity standards and awareness. In addition, TAG's Information Security Society provides ongoing resources for emerging and seasoned tech professionals alike. Finally, TAG-Ed is partnering with the CyberWarrior Foundation to create high-wage career opportunities for historically underrepresented communities by providing cybersecurity training. To learn more about their program: <https://www.cyberwarrior.org/cyber-security-workforce-development-and-training-pilot-for-underserved-communities/>.

Larry K. Williams
President
TAG / TAG-Ed

Larry K. Williams serves as the President and CEO of the Technology Association of Georgia (TAG) and President of the TAG Education Collaborative (TAG-Ed). TAG-Ed's mission is to strengthen Georgia's future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.

Cyberstart America

IN GEORGIA

A FUN AND ENGAGING PROGRAM TO IDENTIFY AND ENCOURAGE FUTURE CYBERSECURITY PROFESSIONALS

CASH PRIZES EXCLUSIVELY FOR GEORGIA STUDENTS & SCHOOLS!

STATEWIDE SUPERSTARS

Recognizing Georgia's top students and schools in the CyberStart America program (CSA).

CYBER EXPLORERS

The top 10 Georgia students new to CSA with the highest point score by the CSA closing date (April 4, 2023) each receive a **\$500 cash prize.****

CYBER ADVANCERS

The top 10 Georgia students returning to CSA with the highest point score by the CSA closing date (April 4, 2023) each receive a **\$500 cash prize.****

CYBER TALENT SCHOOL

The Georgia school with highest cumulative point score in Georgia among their registered CSA participants will receive **\$2500.**

CYBER BREAKOUT SCHOOL

The Georgia public school with highest number of CSA participants* that does not have an existing cyber pathway will receive **\$2500.**

CYBER PROGRESS SCHOOL

The Georgia school with the biggest increase in National Cyber Scholarship Semifinalist qualifiers from 2022 to 2023 will receive **\$2500.**

TERMS AND CONDITIONS

**For the purposes of awarding school and district awards, a participant is an eligible student who has registered for the CyberStart America program in 2022-23, and completed at least one challenge in CyberStart.*

*** A school can only win one Georgia-specific prize per year across all categories. An individual student can only win one single Georgia-specific prize per year across all categories and cannot win a Georgia-specific prize two years in a row- they may be eligible for additional awards via the National Cyber Scholarship Foundation.*

If a school or district that has won an award from a previous year is eligible to win an award in this year, they must submit their report on how the previous year's funding was spent before they can receive their award for this year.

DISTRICTS OF DISTINCTION

Recognizing Georgia's Public School Districts that are encouraging the greatest participation in CyberStart America.

The Top 10 Georgia Public School Districts with the **highest total CSA registrations by January 16th** will be awarded the title **District of Distinction**, giving the students and schools in that district the chance to qualify for the prizes outlined below.**

DISTRICT OF CYBER TALENT

The District of Distinction with the highest number of National Cyber Scholarship Semifinalist qualifiers by the CSA closing date (April 4, 2023) receives a top prize of **\$5000.**

DISTRICT SUPERSTARS

Exploring Superstars: The 2 students new to CyberStart America in each District of Distinction with the highest point score by the CSA closing date (April 4, 2023) each receive **\$500.****

Advancing Superstars: The 3 students returning to CyberStart America in each District of Distinction with the highest point score by the CSA closing date (April 4, 2023) each receive **\$500.****

That's \$2,500 per district going to their top participants!

DISTRICT CYBER OPPORTUNITY SCHOOL

Within each District of Distinction, the school with the highest percentage of its total student body participating* in CyberStart America (CSA) will receive **\$2,500.****

DISTRICT CYBER EXPANSION SCHOOL

Within each District of Distinction, the school with the biggest increase in CSA participants* from 2022 to 2023 will receive **\$2,500.****

The title of District of Distinction will be awarded based on student registration numbers in CyberStart America (CSA) from that district by January 16th 2023. Cash prizes will be awarded based on student participant numbers in CyberStart America (CSA) from that district by April 4th 2023.*

Learn more about Cyberstart America in Georgia
EMAIL CyberStartGeorgia@ung.edu **WEB** go.ung.edu/cyberstart-georgia



The *Winners Circle*



The Technology Association of Georgia Education Collaborative's annual event and auction benefiting STEAM education and TAG-Ed.

November 3, 2022

[Learn More Here](#)



The Manufacturing Skills **Gap**: *What Is It and How to Solve It?*



The manufacturing skills gap is not simply a buzzword within the industry. Instead, it's the reality that many manufacturers in Georgia are facing right now. Let's explore what is causing this divide, and steps employers and education institutions can take to bridge it.

The manufacturing industry is a juggernaut when it comes to moving the economy forward. According to the National Association of Manufacturers (NAMI), manufacturers in the United States accounted for 11.39% of the economy's total output in 2018. In addition, plants across the country created over \$2,334.60 billion in product output for a wide range of industries and consumers. Yet, jobs are going unfulfilled.

Job positions remain empty because there aren't enough skilled workers. Referred to as the manufacturing skills gap, this issue revolves around the labor market being unable to find workers who have the manual, operational,

and highly technical skills, knowledge, or expertise to take the open positions.

The manufacturing skills gap is not simply a buzzword within the industry. Instead, it's the reality that many manufacturers are facing right now. There are more open job positions than there are workers ready to fill them.

A 2021 study conducted by Deloitte and the Manufacturing Institute (MI) predicts that 2.1 million manufacturing positions will go unfulfilled by 2030. These empty positions could cost the U.S. a loss of about \$1 trillion in GDP.

The pandemic also contributed to the loss of manufacturing workers. Roughly 1.4 million jobs vanished at the start of the pandemic, and employers only filled 63% of those jobs with employees returning to work during 2020. Yet, with 570,000 jobs not added back into the industry, the absence of workers may set the manufacturing field back by decades.

Cause of the Manufacturer's Skills Gap

It would be easy to claim that the cause of the skills gap is the adoption of newer technologies. Yet with more automated processes and robotics used on the plant floor, these technologies are actually creating more jobs within

operations. Companies need workers who understand robotics, the Internet of Things (IoT), artificial intelligence, and analytics. As a result, manufacturers are expanding and diversifying their workforce with open positions for:

- Robot teaming coordinators
- Smart factory managers
- Digital twin engineers
- Smart Q.A. managers

Still, pinpointing the cause of the manufacturer's skills gap is not an easy task because there's no singular issue contributing to the problem. However, factors that can impact the skills gap include:

False Job Perception

People have varying perceptions of what manufacturing entails since the industry is so vast while having differing processes based on operations. These perceptions impact how young talent views the industry.

They may look at manufacturing jobs from the viewpoint of their aging parents and grandparents, who might have worked long hours under laborious conditions. They might believe that working in manufacturing means sub-



jecting themselves to a large, dark, and dusty shop floor with workers standing in line assembling products along a conveyor belt that is constantly moving.

Most young employees simply don't want to deal with the same harsh work conditions as they're looking to break out of the generational job rut. These outdated perceptions lead to disinterest in younger workers.

Lack of Technology Skills Sets

Even if you can change the perception of manufacturing into the ideal of a bright and clean plant with shiny robot arms welding and assembling parts, people still aren't rushing to fill positions. Some workers may have one skill that may or may not be highly specialized.

tech·nol·o·gy

/tek'näləjē/

noun: technology; plural noun: technologies

- the application of scientific knowledge for practical purposes, especially in industry. (science is best defined as the systematic accumulation of knowledge.

“advances in computer technology”
- machinery and equipment developed

from the application of scientific knowledge.

- the branch of knowledge dealing with engineering or applied sciences.

In today's job market, many manufacturers are looking for workers who have several skill sets. They want workers who know about IoT, robotics, and automation. While machinist knowledge is desirable if the machinist is also versed in engineering and advanced robotics, they have greater opportunities to land available jobs. Manufacturing employers covet workers with overlapping skills.

However, this desired trait isolates some adult employees. Middle-aged workers may shy away from manufacturing jobs as they believe they don't have the time or money to learn additional skills independently. They see manufacturing jobs as a static position that doesn't allow upward mobility due to their lack of additional skills, knowledge, or expertise. They also don't want to take on the debt to learn these additional skills as they will have to carry that financial burden into retirement.

Retiring Baby Boomers

Workers who may have spent their entire employment at a manufacturer are now leaving the workforce. These are highly skilled employees who have

10+ years of experience under their belt. Finding replacements for these employees is extremely difficult. Not only did these workers bring in a unique set of skills when first taking on the job, they learned their enhanced expertise with hands-on experience.

When it comes to operations using customized equipment and machines, it can be nearly impossible to find workers who understand and have in-depth knowledge of the same equipment that can get started immediately on the production line. As a result, many manufacturing leaders may find themselves in the position of trying to lure talented veteran workers from other competing facilities.

They might also offer higher salaries and more enticing benefits packages. Yet smaller manufacturers on tight budgets may not be able to afford to take this route to locate experienced employees. Also, they may not want to take the chance that the baby boomer might soon retire if they do find someone.

Blue Collar Work Avoidance

In today's society, people hold a stigma toward people who are considered blue-collar workers. Many people view blue-collar workers as less educated. Many young workers also avoid

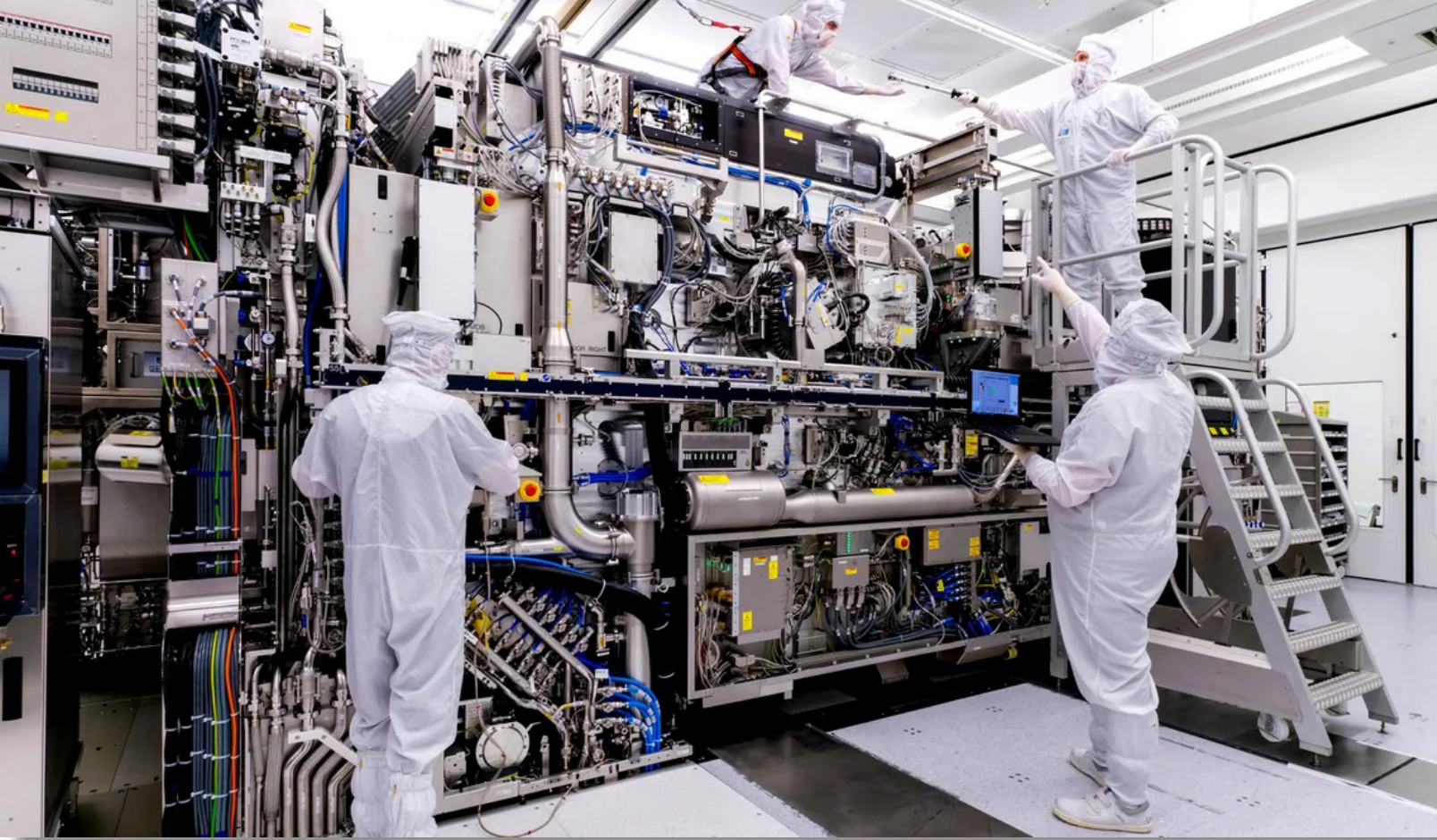
blue-collar work because they believe employees don't fully value this work segment. They believe CEOs and managers place unfair demands on blue-collar workers while paying them the lowest wages possible.

Blue Collar Defined:

A blue-collar worker is a working class person who performs manual labor. Blue-collar work may involve skilled or unskilled labor.

The type of work may involve manufacturing, warehousing, mining, excavation, electricity generation and power plant operations, electrical construction and maintenance, custodial work, farming, commercial fishing, logging, landscaping, pest control, food processing, oil field work, waste collection and disposal, recycling, construction, maintenance, shipping, driving, trucking and many other types of physical work. Blue-collar work often involves something being physically built or maintained.

Due to this mentality, more people flock to white-collar jobs for more job stability, upward career mobility, and higher wages. Unfortunately, this problem has led to a shortage of blue-collar workers taking manufacturing positions, such as welders, machinists, and freight carriers.



Industry 4.0: How It Will Shape the Future of Manufacturing in Georgia

You may have heard that the world has entered its newest industrial revolution. Called the Fourth Industrial Revolution, or simply Industry 4.0, it's the rapid pace of digitalization adoption in the manufacturing industry. It encompasses the digital technology advancements previously discussed above, including robotics, IoT, artificial intelligence, and other tech advancements, including cloud computing, wireless communication, and many others.

Industry 4.0 could advance the manufacturing segment in vast and ever-changing ways as newer innovations enter the field. Currently, Industry 4.0 may allow advanced communication

capabilities within manufacturing equipment through wireless capabilities, meaning that workers may access equipment through any mobile device in remote locations.

Another way industry 4.0 could shape manufacturing is the decentralization of networks and data. Instead, the interconnections of equipment using wireless technologies and the cloud would allow more information transparency in operations.

Workers could access this information effortlessly, allowing them to make better decisions to increase productivity. Employees turn into problem solvers as

they rely on critical thinking and creativity to overcome problems.

The concept of Industry 4.0 could allow for more straightforward and accessible methods for manufacturers to become more efficient and sustainable in their operations. In turn, these advancements could lead to lower waste and increased revenue growth. Having workers who understand these changes and can obtain the skills required for digital adoption in processes will benefit manufacturers in the long term.

Future Jobs in Manufacturing

With Industry 4.0 arriving, many new jobs will appear, only increasing the number of unfilled positions in the manufacturing sectors. These jobs will require workers to understand and fully embrace the digital tools soon appearing in operations. Some job examples that we're likely to see in manufacturing in the future include:

- **Predictive Supply Network Analyst:** These analysts rely on the use of digital tools to move materials through a digital supply network to provide just-in-time (JIT) deliveries.
- **Manufacturing Cybersecurity Strategist:** The strategist helps prevent network security threats and hackers

from creating breaches and stealing data.

- **Smart Factory Manager:** This manager uses machine learning algorithms and artificial intelligence to manage inventory levels and build schedules.
- **Digital Twin Architect:** An architect that makes virtual representations of processes, products, and systems
- **Smart Quality Assurance (Q.A.) Manager:** A manager who uses digital tools to manage product quality
- **Collaborative Robotics Technician:** This technician sets up, monitors, and maintains collaborative robotics systems.



Skills Lacking in Manufacturing

Keep in mind that the skills required for a manufacturing position will depend on the specific work provided. Also, these skills may change if the requirements for the position changes.

Generally, manufacturers may seek out people with the following skill sets:

- **Manufacturing Experience/ Know-How:** Previous work experience in the field or in a related area where skills are transferable
- **Physical Know-How:** Physical experience with manufacturing tools, such as welding and machining
- **Digital Fluency:** Having the aptitude for interpreting and using digital information
- **Programming:** Proficiency with computer programming languages and debugging tasks
- **Problem Solving/Troubleshooting:** The ability to process problems and find solutions
- **Big Data Analytics:** Understanding how to use advanced analytical techniques with large data sets
- **Soft Skills:** Consists of core or common skills, such as work ethic,



communication, adaptability, teamwork, and leadership.

Fixing the Skills Gap

To fix the wage gap, manufacturers will need to focus on the worker challenges commonly faced in the industry as mentioned above, including young workers having a false perception of manufacturing, blue-collar job avoidance, retiring older workforce, and lack of technology skill sets. Here are some ways that manufacturing leaders can help bring more workers to the industry:

Take Advantage of MFG Day

Manufacturing (MFG) Day occurs annually, usually in October. It provides an opportunity for manufacturers to throw open their doors and invite the public to see what's involved with their

manufacturing processes. The public can observe how workers interact with machinery and other manufacturing methods and advancements, as the day inspires curiosity and allows people to ask questions.

Using MFG Day as a learning day may help change the skewed perception that many young workers have about the manufacturing industry. It also shows them the possible jobs available that they may want to pursue as a lifelong career. According to the U.S. Department of Commerce, there are typically 2,600 open houses held every year with roughly 400,000 parents, students, and community members in attendance.

Educate Younger Workers and Students

Once piquing the interest of young workers and students, you need to keep that interest going and motivate them into taking that next important step toward a career in manufacturing. Disseminating manufacturing job information and skill requirements to younger workers and students allows them to understand what skill sets employers are looking for so they can tailor their education to align with the open job positions.

Manufacturers may also hold workshops and seminars about how to operate

certain tools and machines. Having students gain hands-on experience allows them to develop their physical know-how regarding tool usage further.

Upskill Current Workers

Never overlook the current workforce. Existing employees may be eager to enter new job positions in the company if given the opportunity for enhanced learning. Developing the required skills in existing employees may allow them to become specialized in specific processes and special equipment. It also cuts down on hiring costs.

Steps Employers and Education Institutions Can Take to Tackle the Skill Gap Current manufacturers and educational institutions may not be in alignment regarding the types of skills workers require. According to the Brookings Institution, employers may partner with local higher education institutions to offer intern programs. These intern programs can overcome the existing skills gap obstacles and offer degree and credentialing pathways to help students succeed.

Another option for both employers and educators is to have postsecondary programs that offer a more transparent look into what competencies students hope to gain from learning.

Understanding the skills they need to obtain allows students to make better career decisions when seeking manufacturing jobs.

Young workers may also get involved with many online manufacturing programs that can help support their careers in this exciting field. Some programs include the NIIMBL eXperience, the AFFOA's MITxFIT Program, Next-Flex's Flex Factor, and RAPID's eLearning Programs.

Students, workers, or employers interested in these programs can visit Manufacturing USA, a network of member institutes sponsored by the U.S. Department of Energy, Commerce, or Defense.





Libby Johnson: On the frontier for nuclear safety

By Sumner Gibbs

Oak Ridge National Laboratory physicist Elizabeth “Libby” Johnson (1921-1996), one of the world’s first nuclear reactor operators, standardized the field of criticality safety with peers from ORNL and Los Alamos National Laboratory. Her work came on the heels of two incidents involving nuclear materials that took the lives of two government researchers at the end of the Manhattan Project.

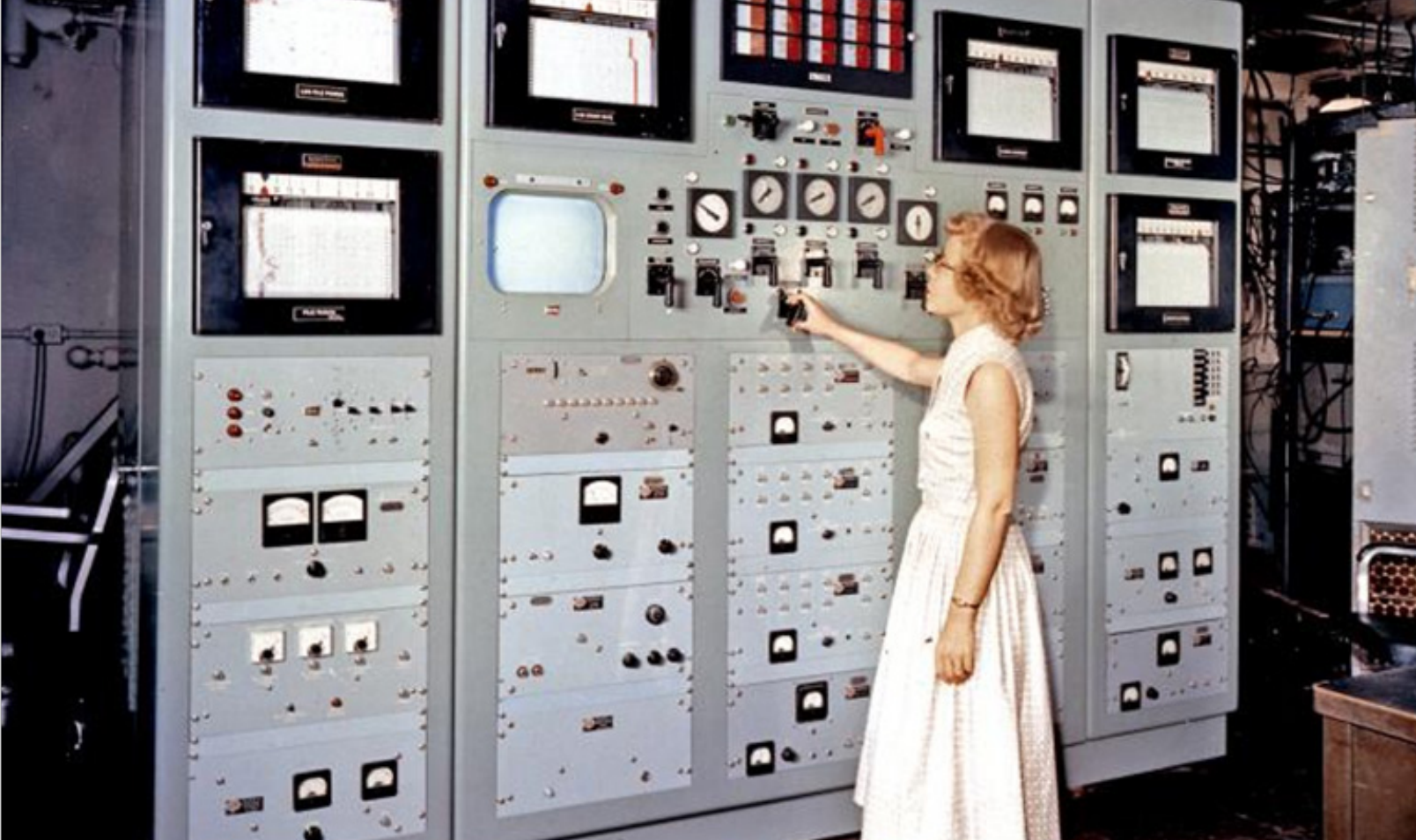
Johnson was part of a team addressing the need to hasten safety in modern nuclear science. As proof of their successes developing criticality standards, there hasn’t been a criticality accident on United States soil since 1978.

“The experiments that you and your colleagues conducted over these years were crucial to the whole business of nuclear energy,” former ORNL Director Alvin Weinberg told Johnson’s colleague

and mentor, Dixon Callihan, in 1996. “All of us owe you a great debt for your having pioneered in this ever- so-important enterprise and shown the way.” Callihan directed ORNL’s Critical Experiments Facility, where Johnson worked as a senior experimenter for more than a decade.

A golden age for criticality experiments lasted from the 1940s to the mid-1970s. During this era, criticality experiments and work at research reactors primarily focused on reactor design, creating the stepping-stones for today’s commercial reactors. Johnson and her cohorts conducted hundreds of experiments, setting the groundwork for developing the first nuclear safety standards for nuclear researchers and future reactor operators.

The Oak Ridge Critical Experiments Facility was established in Building



ORNL physicist Libby Johnson demonstrated a new control panel at ORNL's Bulk Shielding Facility in 1957. Among the first females to operate a nuclear reactor, Johnson blazed trails for women. Credit: ORNL, U.S. Dept. of Energy

9213 in 1950.

This isolated facility, now slated for demolition, had been constructed for uranium storage and was remodeled to support the studies underpinning the safety standards. Years later, Callihan would recall his unsuccessful efforts to get a women's restroom included in the remodeling plans – a request that was later granted. His advocacy for this amenity contrasted sharply with the overall scientific environment of that time, which was organized by and optimized for men.

“Johnson trod the silent path of women's history in the nuclear industry,”

said Nuclear Regulatory Commission historian Thomas Wellock.

Johnson's influence on criticality safety and the nuclear field has gone mostly unnoticed except for her listings in *American Men and Women of Science*, a biographical reference work on leading scientists in the United States and Canada, and the membership roster of the New York Academy of Sciences.

However, within the nuclear field, she was recognized in 1975 by the American National Standards Institute's Nuclear Standards Management Board, citing Johnson's contributions to the development of standards.

In 1982, the American Nuclear Society, or ANS, made her a fellow. In 1985, ANS recognized Johnson with an achievement award through its Nuclear Criticality Safety Division. And in 2013, ANS posthumously awarded Johnson with its Standards Service Award. Both organizations are major proponents of nuclear standards in the U.S.

In 1944 at age 23, Johnson (née Briggs) was a graduate student in physics at Vanderbilt University when she was recruited to work on the Manhattan Project at Columbia University. At Columbia, she met and married another young physicist, Ned Johnson. Libby Johnson returned to Vanderbilt to finish her master's degree, and Ned Johnson began working at ORNL. Then in 1948, Libby Johnson was hired as a research assistant at the K-25 uranium-enrichment plant.

From 1950 to 1961, Johnson worked as a supervisor and senior reactor operator at ORNL's Bulk Shielding Facility, which housed the Bulk Shielding Reactor, the first swimming pool reactor, and the Pool Critical Assembly, completed in 1958. Both the reactor and the assembly featured a core and control rods submerged in an open pool of water that provided cooling and radiation shielding. Johnson oversaw fuel loadings and reactor maintenance,

trained reactor operators and coordinated experimental programs. She also taught students from ORNL's pioneering Oak Ridge School of Reactor Technology how to assemble reactor fuel safely. Johnson also wrote the standard operating procedure for the Pool Critical Assembly issued in 1960.

"To me, she was the gospel in performing experiments safely with aqueous solutions containing enriched uranium," said John Mihalcz, who joined ORNL in 1958 and, although retired, continues documenting early experiments for future generations.

In 1954, Johnson became a charter member of ANS, which was established to provide education about nuclear energy and a publication outlet for peer-reviewed articles and standards. Over the course of her membership, she served in leadership roles, chairing ANS's Nuclear Criticality Safety Division, speaking at numerous national standards meetings, forming standards subcommittees, contributing immeasurably to standards writing groups as both member and secretary and mentoring incoming professionals. Johnson also helped found Oak Ridge's ANS chapter.

"Just watching her at standards meetings was a great education," said Ron Knief of Sandia National Laboratories.



From left, rocket scientists Ernst Stuhlinger and Wernher von Braun got a tour of ORNL's swimming pool reactor in 1957 from Libby Johnson, Bulk Shielding Reactor supervisor. Credit: ORNL, U.S. Dept. of Energy

“I witnessed this diminutive woman frequently going toe-to-toe with the [criticality safety] giants of the time.”

When the first commercial nuclear power plants began operations in the late 1950s and early 1960s, the U.S. Congress recognized the need to involve the public in decisions that affected local communities. It charged the Atomic Energy Commission to form the Atomic Safety Licensing Board, which hosted open hearings that included legal and technical experts to answer questions from the public and discuss concerns before construction licenses were issued.

The Nuclear Regulatory Commission

appointed Johnson to the board in 1975 as its first full-time female technical expert. When Johnson retired in 1994 as the longest serving female in the board's history, she remained its sole female technical expert.

Today, mostly because of rigorous regulations and a shift in funding priorities, scientists rarely perform the type of criticality experiments Johnson led. As a result, criticality safety professionals now obtain data mostly from simulations and prior experiments, such as the ones Johnson and her colleagues performed that led to their foundational discoveries.

The current International Criticality

Safety Benchmark Evaluation Project Handbook, a reference used by criticality safety professionals, documents 91 of Johnson's experiments. "Johnson continuously built upon the body of knowledge that is still used today," said Douglas Bowen, head of ORNL's Nuclear Criticality, Radiation Transport and Safety section." She was a pioneer among pioneers."

Johnson also helped open doors for women in nuclear science – including her granddaughter, Autumn Higgins, who joined the Nuclear Navy in 1995, a year before Johnson's death. In 2022, Higgins earned her senior reactor operator license for the Tennessee Valley Authority's Sequoyah Nuclear Plant.

"If I could talk to her today, I would want her to know her struggle meant something for me and other women," Higgins said. "Not only her scientific contributions, but also her personal contributions. They meant something."

— Sumner Gibbs





Techie Trot 2023

Saturday January 21, 2023

7am - 10:30am

TAG North Metro Office

4400 North Point Parkway, Suite 155, Alpharetta, Ga.

This years Techie Trot is in direct support of career and workforce development across Georgia.

Early registration: \$30

After Nov 9: \$40

Register Today Here

For more information, contact: heather@tagonline.org



TAG-Ed
Education Collaborative



Donate to Georgia public schools and reduce your state taxes

Georgia Foundation for Public Education encourages support of state schools

Davis Knox is a resident of Athens-Clarke County and founder and CEO of Fire & Flavor. He serves as chair of the Georgia Foundation for Public Education. In this guest column, he explains the foundation's purpose and encourages Georgians to donate to public schools through the foundation.

By Davis Knox

Our schools have been through a lot in the last two years, and students and teachers need our support. If you love the state of Georgia and want to see our public schools strengthened, consider supporting public schools through a donation to the Georgia Foundation for Public Education. In exchange for your donation, you can receive a dollar-for-dollar state tax credit, which we call the Qualified Education Donation (QED) tax credit.

Donated funds are directed toward innovation in Georgia public schools, with a specific focus on the lowest-performing 5% of schools. Schools and school districts have the opportunity to apply for grant funds for projects they propose, meaning the ideas and projects we fund are developed and steered from the ground up, by those who know students best.

In May 2021, Gov. Brian Kemp signed legislation merging the Innovation Fund Foundation — formerly housed within the Governor's Office of Student Achievement — with the Georgia Foundation for Public Education, the philanthropic arm of the Georgia Department of Education. The two organizations now operate under the GFPE name, expanding our capacity to fund innovation and meet financial needs in Georgia's K-12 public schools. Specifically, the merger expands fundraising capacity for the Qualified Education Donation — we are working to increase donations made through the tax credit program and ultimately provide more funding to support innovation and expand opportunities for students.

The Qualified Education Donation has previously funded support for COVID-19 relief efforts in Georgia schools, Innovative Education Fund grants for teachers, the Governor's Honors Program, and more.

Specific examples include:

- Early County High School used an Innovative Education Fund grant to implement a program emphasizing real-world science experiences, with a focus on agriculture — helping students learn skills they could apply to future careers. The program trained students to use unmanned drone devices to survey farmland and collect data for local farmers.
- The Richmond County School System used an Innovative Education Fund grant to provide 24/7 on-demand and live instruction for K-12 students, allowing students the opportunity to receive tutoring services aligned with their needs and family schedules.
- Ivy Preparatory Academy used an Innovative Education Fund grant to implement Raspberry Pi, a program designed to teach students the fundamentals of computer science.
- Houston County's Northside Middle School used an Innovative Education Fund grant to establish a STEAM Farm to enhance hands-on and project-based learning. Specifically, the grant allowed the school to expand its recycling program and raised vegetable beds, and add hydroponic towers, a quail hatchery, an arboretum, and seating for an outdoor classroom.

All Georgians — from parents, families, and students to educators to business owners — benefit from a strong public education system. Donating through the Qualified Education Donation is one of the simplest and most impactful ways you can show tangible support for public schools in our state.

I encourage you to become a donor and invest in public education today.

To learn more, including tax credit limits based on filing status, go to gfpe.org/tax_credit/donor_information.



Will the Sun Soon Power First Responders?

The Science and Technology Directorate

Fabric woven to harness solar power recently completed weaving trials. The fabric will ultimately be used to design high-functioning gear that can keep responders' tech charged and ready.

Shining Solution

Millions of American homes are powered by solar panels, capturing light shining down from above and converting it into electricity. Solar power is a well-established energy resource with enormous potential and countless applications—perhaps limited only by our imaginations. Good thing imagination is an endlessly renewable resource for the Science and Technology Directorate (S&T).

The idea of clothing that can capture sunlight and turn it into electricity may sound like something out of science fiction, but S&T is working to make it a reality. Photovoltaic (PV) energy harvesting fabric is not only possible, but also a practical solution to a persistent

challenge. First responders need lightweight power sources for their sensors, and other body-worn electronic devices.

Energy harvesting fabric mitigates risk associated with relying solely on wall outlets to charge equipment. For instance, during a natural disaster and emergency response, the power grids may be compromised. The fabric also eliminates the need to carry extra batteries.



Fabric swatch with various patterns. Photo credit: University of Massachusetts Lowell.

“Smart textiles are the future,” said S&T Program Manager Kimberli Jones-Holt. “This energy harvesting fabric project is incredibly innovative. I’ve been so impressed by the ingenuity of the research team and I look forward to the day that first responders are wearing and benefitting from this product.”

A Stitch in Time

The First Responder Resource Group initially identified this capability as a high-priority need, and S&T listened. The solution in development now involves creating a PV fiber that can be woven into a power fabric and then integrated onto first responder garments, shelters, and related equipment to provide reliable power for charging batteries to power electronics.

The power output of the fabric will be sufficient to charge AA batteries in eight hours. This effort will provide the foundational framework towards the development of commercially viable, textile-integrated, energy-harvesting PV devices that can be tested for direct application in the field.

S&T awarded \$199,260 to Boston-based company Protect the Force, LLC, in August 2018 to initiate this work through the Silicon Valley Innovation Program. The University of Massachusetts Lowell (UML) is also

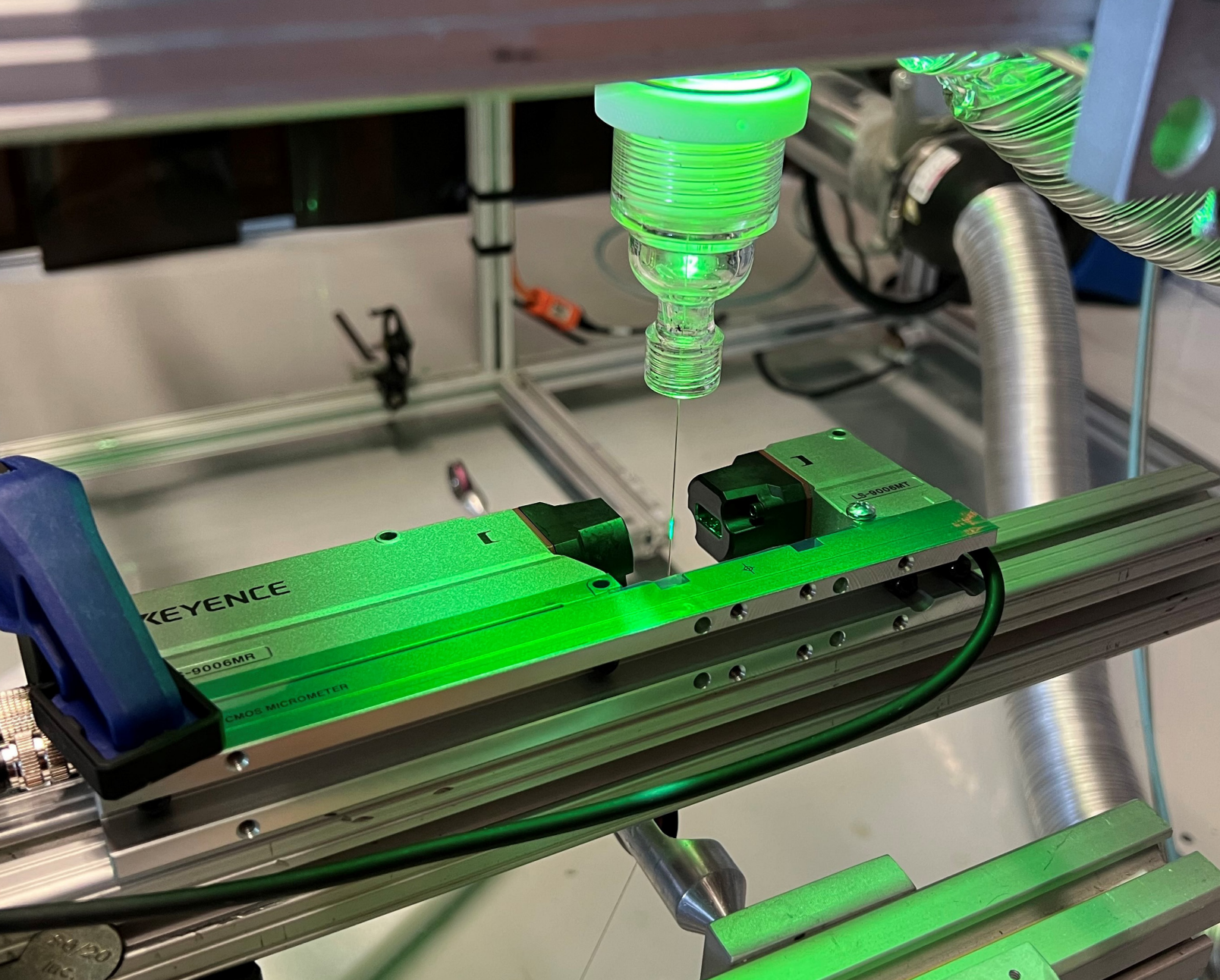
partnering on this important project through its world-class Fabric Discovery Center. Together, the team of industry, academic, and S&T experts created an initial prototype fabric with fibers containing an incredibly thin light harvesting coating on smooth stainless-steel wire core that measures only a few hundred nanometers.

This allowed the team to successfully demonstrate the proof of concept at small scale (100 cm² fabric swatch) in July 2019 and then move on to the next phase of development.

Work in Progress

A key testament to the team’s real-time ingenuity and problem-solving is the way they have been able to adapt and reconfigure their equipment. Their curing process is a prime example of this. They needed an ultraviolet lamp to cure the wire cladding since uncured wire is sticky and thus hard to work with. (Cladding is the application of protective layers for insulation.) Working at the cutting-edge of technology meant there was nothing commercially available for their purposes.

The team was able to identify UV curable cladding material and the appropriate UV lamp to ensure uniform, even curing of the wire and subsequent quality and reliability of the fabric.



Measuring the stainless steel wire. Photo credit: University of Massachusetts Lowell.

A Bright Future

Phase II includes initial production, testing of the PV energy harvesting fabric swatches, and demonstration of integration onto a firefighter garment. While the initial application is planned for wild-land firefighting, S&T is exploring compelling opportunities to transition the technology to other Department of Homeland Security agencies and beyond.

“What we learn during this process can be used for a lot of other things,” added Dr. Ramaswamy Nagarajan, UML Engineering Professor and Co-Director of the Center for Advanced Materials.

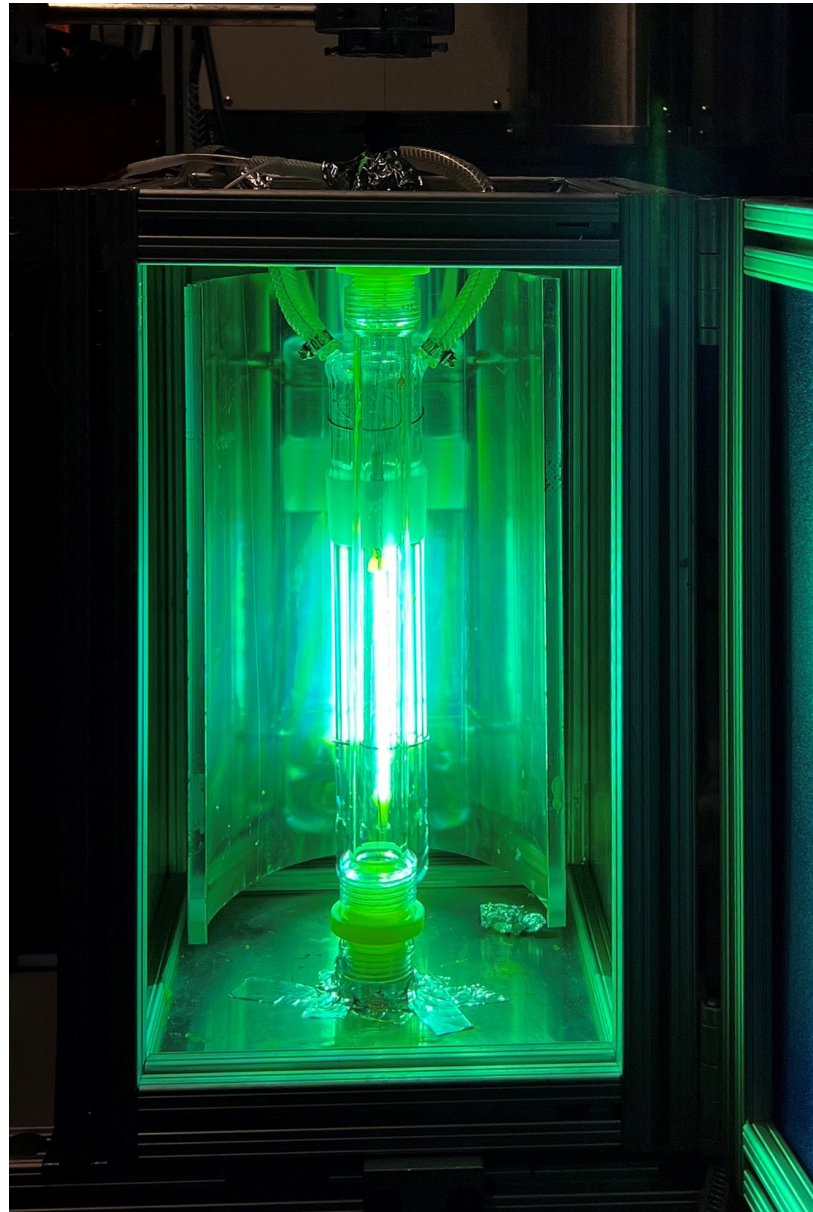
“We need to get this right to enable future applications.”

In the Spring of 2022, UML successfully conducted weaving trials. The team integrated the PV nanofibers with hundreds of feet of Nomex® yarn, a flame-resistant textile used in protective apparel, using a Thread Controller 2 digital loom.

Design optimization is now currently underway. Developers are working on weaving designs for the textile fibers that maximizes exposure to the sun and thus creates peak energy output from the fabric. They are experimenting with various patterns including twill, satin, dobby, and broken twill. Flexibility and water repellence are other very important factors, and both depend upon proper cladding.

Developers will also test resistance to various stressors to ensure compliance with National Fire Protection Association standards and work to make the fabric breathable, which has proven to be a significant scientific challenge.

The project will conclude later this year with the completion of Phase II. “The work that has been done to this point will be used to help determine additional interest from the first responder community for this type of technology,” explained Jones-Holt. “The task will closeout with the development of energy harvesting fabric woven into a first responder garment.”



Ultraviolet lamp used for curing the wire cladding. Photo credit: University of Massachusetts Lowell.

Learn more about energy harvesting fabric on our website and contact STMedia@hq.dhs.gov with related media inquiries.



pets in the
classroom

By **Matt Coffindaffer**
Executive Director
The Pet Care Trust

Funding for Classroom Pets Available to Teachers

Pre-kindergarten through 9th grade teachers who are interested in owning or who already own a classroom pet can apply to receive funding through the Pets in the Classroom grant program.





The Pet Care Trust's Pets in the Classroom grant program will be accepting applications for the 2022-2023 school year beginning August 1, 2022.

The grant program, which was established by the Pet Care Trust, provides funding for a small animal or pet supplies to pre-kindergarten through 9th grade teachers in both private and public schools who desire to introduce a pet into the classroom or who already have a pet in the classroom. Interested teachers are invited to apply.

While classroom pets are a valuable teaching tool, many teachers have very limited resources for the support of classroom animals. Through the grant program, teachers have the option of obtaining a pet from one of the program's participating retailers:

- Petco
- Petsmart
- Pet Supermarket
- Pet Supplies Plus
- Petland

or of purchasing their pet from a local pet store through a rebate grant.

Past grant recipients are not eligible to receive funding for a new classroom pet, but are welcome to apply for a sustaining grant, which provides up to \$50 to maintain an existing classroom pet or purchase another classroom pet. With seven different grant types available, each teacher has the opportunity to choose the grant that is right for him or her through a direct, no-hassle application on the Pets in the Classroom website (www.PetsintheClassroom.org).



Classroom pets have made a substantial impact in the lives of students during the 2021-22 school year. Through a survey conducted this spring by the Pets in the Classroom grant program, teachers across the U.S. and Canada shared valuable insight into the multitude of ways that students are benefiting from interacting with pets in an educational setting:

- 98% of teachers saw an increase in empathy and compassion, thanks to a classroom pet.
- 98% of teachers saw an increase in student responsibility.
- 98% of teachers saw an increase in student engagement.
- 96% of teachers saw an increase in social skills.
- 95% of teachers saw some decrease in anxiety among students.
- 94% of teachers surveyed saw an improvement in students' self-esteem.
- 90% saw a decrease in necessary student disciplinary measures.
- 86% of teachers saw an improvement in attendance due to their classroom pet.

- 84% of teachers saw an improvement in test/academic performance.

The survey results, which included hundreds of stories shared by teachers, reinforce the results of numerous studies: there are many benefits that pets can provide to students, especially in the form of social-emotional support.

Through the survey, teachers shared stories about children who were able to overcome anxiety upon returning to school, those whose anger and behavioral issues subsided after a classroom pet helped them learn empathy, those who became motivated in learning, and more.

One teacher stated, *"We have utilized our pets as anxiety reducers for tests such as the STAAR, or simple motivators to positive behaviors and completing work. The pets are known all around the school and my students' confidence has grown immensely as they take the pets into other classes and introduce them. I've found my students are empathetic and share more with a pet than they did without them in our classroom. The difference in behaviors is also astonishing."*

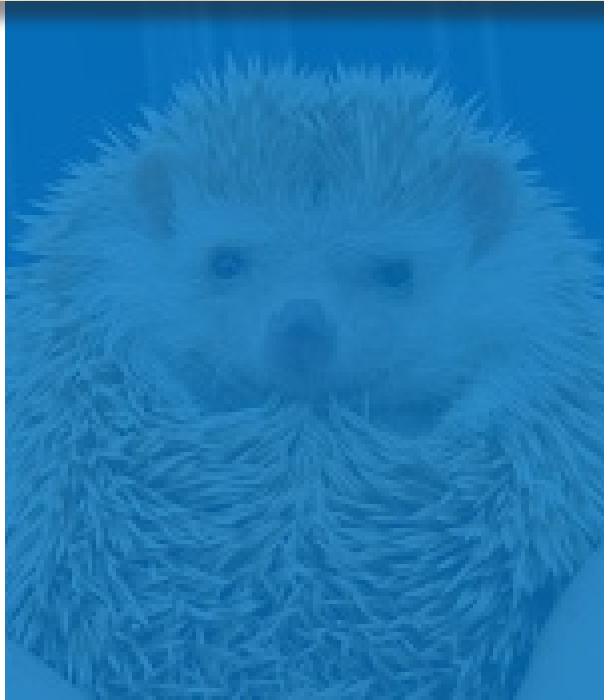


During the 2021-22 school year, 19,100 Pets in the Classroom grants were awarded to teachers, bringing the total number of grants issued to over 202,697 since the program's inception in 2010, meaning an estimated 8.1 million children have experienced the joys and benefits of pet care through the grant program.

As teachers look for more ways to help with students' social-emotional needs in the upcoming school year, the Pets in the Classroom grant program is ready to help by providing funding for classroom pets to pre-K – 9th grade teachers across the U.S. and Canada beginning August 1.



<https://www.petsintheclassroom.org>



STEM Integration

into *your* class today and everyday

by Wayne Carley

“My class is not a STEM class. I’m an English teacher.”

Yes, technically you are a STEM teacher as you are using STEM skills by definition with every assignment, lecture and test.

As a reminder, science is defined as the “**systematic accumulation of knowledge**” and is absolutely necessary for any term paper, history lesson or learning evaluation. This is the “S” in STEM. The use of Google, online libraries, computer and software use, all of which are a daily part of your class and homework assignments is obviously the “T” for technology (the practical application of science). They are only “users” of the technology rather than innovators, but still intimately attached to the “T”.

“E” for engineering is the use of the engineering method (a decision making and problem solving process) that makes a term paper or other writing assignment impossible to accomplish without. Simple decisions about how to organize and prioritize content is a perfect example of that method impor-

tance and use. We use it 10 times a day if not more, and English class is no exception.

Math, the “M” of STEM is also used to a lesser degree perhaps, but used none the less. From a simple “word count” calculation, which happens to tie in closely to the engineering method of decisions, to statistics, dates, time spans and more, some level of basic math is included.

Here we have shown how STEM skills are a regular part of the typical English class. The question remains, is the English teacher even aware of this?

It may be a simple lack of **awareness**, which happens to be a primary objective of Georgia Pathways Magazine.



Students NEED to see the practical connection between what is being taught and why they need to learn that information. Name one career that does not require some form of written communication daily, either from filling out forms or sending E-mails to clients or preparing written presentations to acquire new customers or customers?

The skill set needed is not just creative writing, but the complete set of STEM skills and more importantly, the knowledge that they are using them. Aside from your curriculum, this too is your responsibility to adequately prepare your student to enter the work force.

This simple and “non-curriculum” type of integration and awareness has value far beyond our understanding, both for the educator, student and parent.

Our responsibility as educators to prepare our students goes well beyond our specific subject field or standardized test and this type of easy integration should be not a burden on our available class time. It can be fun and potentially improve the performance of students in other areas as they make these connections early in their scholastic development.

Every career field, from secretary to scientist requires the skills being

“Seeing the practical connections”

This could be your “Verbal Integration” in any class period an any day only takes about 30 seconds.

- Bring to the attention of your students that they are using science to do their assignment (*the systematic accumulation of knowledge*).

Now they begin to make a conscience connection between the assignment and the “S” in STEM and the journey begins. If you have another 30 seconds, ask someone to name any job that requires writing or learning something everyday?

used and honed in your classroom everyday, from listening to instructions to research and both written and verbal communications.

Your class is a STEM class in practical application and STEM skills definition making your a STEM leader and far more influential in the career paths of your students today.

For more information about quick and powerful “STEM Integration” in your subject, reach out to the publisher at wayne>tagonline.org

WORKFORCE DIVERSITY PROGRAM

The CyberWarrior Foundation, in partnership with the Security & Infrastructure Security Agency (CISA), is creating high-wage career opportunities for historically underrepresented communities, including the underserved, women, veterans, and underemployed individuals.

Our mission is to bridge the technology skills and diversity gaps by providing cybersecurity training, employment opportunities, and transitional support necessary for people to gain the knowledge, skills, and abilities for career opportunities and growth. We understand that strength lies in differences, not in similarities, so diversity is our core value, and we actively promote it through the cybersecurity industry.

Our Cybersecurity Workforce Development and Training Program for Underserved Communities, in coordination with the Department of Homeland Security and CISA, serves people from the Northeast (CISA Region #1) and the Southeast (CISA Region #4).

If you are from a state on one of the following maps, visit cyberwarrior.org/diversity for more information.



BOOTCAMP PROGRAM OVERVIEW

CyberWarrior has developed a training that brings together vocational lab-driven exercises delivered by ethical hackers and industry experts, combined with the hands-on knowledge, tools, and certifications necessary to launch a career in cybersecurity. Further, the content was built using the National Institute of Standards and Technology (NIST) framework and mapped to the National Initiative for Cybersecurity Education (NICE).

CLASSROOM AND LAB TRAINING

4
national recognized
certifications

800
Hours

28
weeks

7
proprietary
technical courses

INDUSTRY-RECOGNIZED CERTIFICATIONS + PROPRIETARY TECHNICAL COURSES

- ✓ CompTIA Network+
- ✓ CompTIA Security+
- ✓ EC-Council Certified Ethical Hacker (CEH)
- ✓ EC-Council Certified Network Defender (CND)
- ✓ Malware Analysis
- ✓ Incident Response
- ✓ Security Automation
- ✓ Firewalls and IDPS
- ✓ Vulnerability Management
- ✓ Package Analysis
- ✓ Security Monitoring

Our students have the opportunity to receive 27 college credits, making CyberWarrior Cybersecurity Bootcamp the most comprehensive cybersecurity program today.

Our innovative Career Hacks course delivers the soft skills to engage in the “business” of cybersecurity. Moreover, CyberWarrior exclusively connects the students with industry practitioners (recognized CISOs, security directors, and more) to share real-world experiences, “a day in the life” of a Cybersecurity professional, what the student should expect upon graduation, and receive personal mentorship each week.

DELIVERY METHODOLOGY

CyberWarrior’s curriculum is refined for online learning and is purposely dynamic to meet the evolving needs of our employer partners. Our model includes 4-hour online classes with live instructors, quizzes, and hands-on labs, in individual and group settings. Instructors are experts who can give real examples of our content’s relevance during an attack.

Launch your cybersecurity career in just six months.
To learn more, visit us at CyberWarrior.org/diversity.



Content Invitation

Georgia Pathways™ STEM Magazine requests the privilege of including your content or the content of your students in upcoming issues. This is a great opportunity for students to be published and for educators and industry professionals to share their insights and wisdom regarding careers across Georgia.

If you have questions, please contact the publisher at:

wayne@tagonline.org

770.370.1905

Content submissions:

- Word.doc format
- **Completely** revised and spell checked.
- Everything as an attachment.
- Unlimited electronic distribution to everyone in Georgia.

Advertising:

- Full page ads are available monthly at a very low cost.

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