August 2025

GEORGIA PATHWAYS

MAGAZINE

Technology That Drives Education

Building The STEM Workforce

Quantum Materials

Supporting The Whole Child

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEM 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 2002. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEM education in Georgia.

President / CEO
Larry K. Williams

Executive Director
Dr. Loretta Daniels
http://www.tagedonline.org

Publisher
Wayne Carley
wayne@tagonline.org

It is my pleasure to welcome you to the August 2025 edition of Georgia Pathways Magazine.

As I reflect on the momentum driving Georgia's innovation economy, one thing is clear: our success hinges on a workforce that is both technically skilled and highly adaptable. Across every sector; healthcare, logistics, manufacturing, agriculture, and beyond, employers are searching for talent to meet the fast-changing workforce demands.

Georgia is projected to add 186,000 new STEM jobs over the next five years, nearly twice the national average. Already, STEM-driven industries support 61% of jobs and generate 71% of our state's economic output. These statistics are milestones on our path to becoming one of the most innovative economies in the nation.

In this issue, The Role of Technology in Driving Education examines how digital literacy is transforming classrooms, impacting 1.7 million Georgia students, as well as 150,000 educators and staff through statewide technology initiatives. Building the STEM Workforce looks at how early exposure to tech skills and strong industry-academic partnerships fuel our talent pipeline.

Resilience for Students highlights the importance of adaptability as a foundation for academic and career success. Quantum Materials takes us to the frontier of scientific discovery, while When AI "Gets" You challenge us to consider the evolving relationship between humans and artificial intelligence. Finally, Supporting the Whole Child explores how a holistic approach can prepare young people not just for work, but for life.

At TAG, we're proud to offer the Pathways to Leadership Certificate Program, our virtual, cohort-based program designed to equip emerging leaders with the skills and strategies required for career advancement. Nominations are open until September 12.

I invite you to read, reflect, and connect with the opportunities you'll discover in these pages. Together, we can continue to strengthen Georgia's tech ecosystem, transforming potential into progress, and progress into prosperity for all Georgians.

Larry K. Williams
President
TAG / TAG-Ed

Larry K. Williams serves as the President and CEO of the TAG and the TAG Education Collaborative. 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.

The Role of Technology in Driving Education

By Wayne Carley

Technology is a driving force to be reckoned with. It's hard to imagine life without the vast resources of tech that often overwhelm us today, much less what current education would look like otherwise. With the dawn of the internet came access to the world unlike anything that had come before.

As with any new ground breaking innovation, decisions had to be made regarding integration into the world, our lives and education. These decisions continue regularly as tech surges at a rampant rate while we struggle to keep pace.

Computer power, portability and affordability are amazing tools in education. During the early years of cell phones it was thought that this tech would be an amazing enhancement to learning for teens at school, with fledgling access to internet data and a wealth of information to enhance learning.

Sadly, we were wrong, as data shows profound misuse and harmful results, primarily due to the immaturity of youth, an expected lack of self control and lack of adult supervision. Wide spread research highlights alarming

damage to mental health, reduced academic performance and a general distraction to learning at school.

As tech in education continues to innovate, this should be a lesson learned. New and exciting doesn't guarantee a safe and healthy application, so mature adult management of tech in education is a must.

The vast tech applications available and in development are enhancing personal and professional skills, forever changing our global education landscape. Upon further examination, the impacts are profound, challenging and encouraging. Here are a few categories to consider as you asses your personal use of tech at home and at school.

Personalized learning

Instant answers to spur of the moment questions are now available. The speed of access to data of any kind has launched personal learning into the stratosphere. The acceleration at which information is available changes the timeline of learning dramatically. It's not just about homework and research papers, it's about the pursuit and absorption of knowledge.

The decisions about whether this access is solely for mandatory school assignments or because we actually enjoy and value learning, face us daily. Our age and career position may determine how we interact or think about this access as not everyone is a "lifelong learner" or enjoys knowledge for knowledge sake, so personalized learning is very personal.

Collaboration and communication

From elementary school to the first career, the need for collaboration and communication is a constant need, and technologies enhance these skills exponentially making us more effective and productive at school and work…should be choose to employ them. From cell phones to Zoom, collaboration and communication on a global scale have revolutionized business, education and personal connection.

These are important examples of driving forces in education. The ability to work together as never before and communicate deeply, often, and effectively, pushes education to prominence in every endeavor.

Access to information

It's been said that knowledge is power, and the power of information is now easily accessed with the click of a mouse. This access has accelerated everything we do in education which leads to our business engagements and personal experiences.

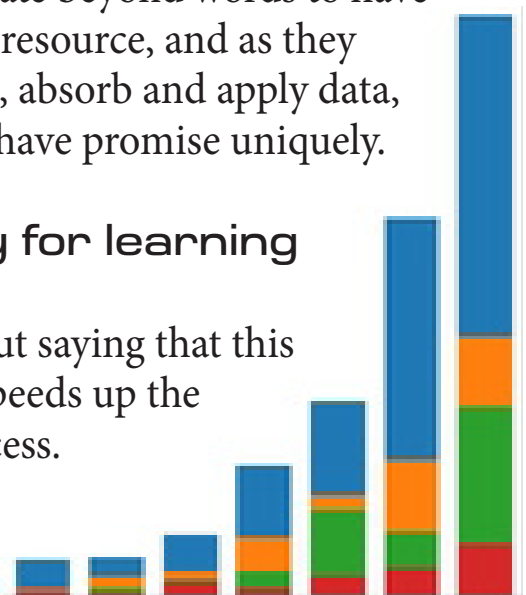
Learning from experience has always had value, and now we can learn from the experiences of vast numbers of individuals in a short period of time. One challenge to this asset is the absorption and application of so much data.

The amount of data available now far exceeds our ability to put it to use on a practical basis, so we need to prioritize the data as required. Our judgment to decide what's important in the moment will remain a challenge since we do make mistakes from time to time about where to focus our attention. Of a more critical nature is the accuracy of the information we are accessing. There is no guarantee that what we access is truthful, accurate, complete, safe or healthy, which complicates our tech interactions. The value of ethical, mature adult over-sight cannot be overstated.

Educationally, the driving tech access of information certainly has the potential of enhancing the learning process in every way. Students and professionals are fortunate beyond words to have this amazing resource, and as they evaluate, sort, absorb and apply data, their futures have promise uniquely.

Efficiency for learning

It goes without saying that this innovation speeds up the learning process.



The hours of library time and card catalogue surfing are history, as we now quickly research history, or any other project on our plate. The efficient collection of information is amazingly fast, saving time and mental energy while allowing for a broader learning experience in a shorter time-span.

Enhancing learning experiences

The uniqueness of current and emerging tech applications in education bring enhanced learning. Virtual reality is an obvious application of the enhanced experiences available, whether it's travel, exercise, experiential instruction, career development or pure imagination. The visual and auditory experiences together bring a new excitement to study and for many, a new passion for learning.

This experiential education resource can foster personal growth, cultural understanding, and real-world knowledge not always found in the classroom. Second only to actual travel, it may promote empathy, self-confidence, problem-solving skills, and memorable lessons in history, geography, and communication. Interactive VR education has unique value emotionally and psychologically with a simulated experiential hands-on application.

Other benefits of technology in education may include:

- Autonomous learning
- Boosting motivation
- Flexibility
- Incorporation of different learning styles
- Improved connection
- Creation of inclusive learning environments
- Critical thinking skills

Preparation for the future

The primary goals of education should be to impart knowledge, develop critical thinking, and foster personal and social growth. These may be the foundational criteria for evaluating tech in education moving forward as preparing for the future is at the heart of education.

I would expect the continuation of tech use long after graduation, as the value of learning and associated tools does not stop after the classroom. Regardless of the career field chosen, the benefits discussed will be valuable and necessary for success and growth in ones professional and personal life. Technologies in education should be healthy and safe tools to achieve goals and ambitions from an early age. As we mature in knowledge and wisdom, it's hoped that discerning decisions are made often when interacting with the changing depth and influence of tech.

Building the STEM Workforce, Starts with Supporting STEM Educators

By Jeremy Anderson, CEO, National Math and Science Initiative

As the American economy continues its rapid transformation, we find ourselves at a pivotal moment—one filled with promise but also marked by urgent challenges. Between now and 2030, the United States is projected to face a shortfall of 1.4 million STEM workers.

At the same time, the American industry is undergoing a historic resurgence. Hundreds of high-tech facilities—including chip fabrication plants, electric vehicle factories, and renewable energy hubs—are breaking ground across the country, reinvigorating local economies, creating millions of new jobs, and repositioning the United States as a global leader in advanced manufacturing and clean energy.

This resurgence is not only a return to industrial strength, but a transformation—driven by innovation, sustainability, and a new generation of STEM talent. This wave of growth signals a bold new chapter for U.S. innovation and manufacturing, but it also exposes a widening gap between our workforce needs and our current education system.

"This is not just a workforce issue; it is an education issue. And the path forward begins not in boardrooms or laboratories, but in classrooms."

If we want to ensure every student can participate in (and help drive) this new economy, we must invest in the people who are best positioned to prepare them—our STEM educators. Decades of research confirm what most of us already know intuitively: teachers are the

most influential school-based factor affecting student achievement. In fact, effective teachers have two to three times the impact of any other school-related factor.

That's why the National Math and Science Initiative (NMSI) is asking a critical question. How do we support STEM teachers in ways that effectively transform student outcomes?

The Front Line of the Future: Teachers

Today's educators face a complex and rapidly evolving landscape. They are tasked with preparing students for careers that didn't exist a decade ago, in fields that require deep conceptual understanding, technical proficiency, and the ability to solve real-world problems. Yet too many STEM teachers report that their professional development (PD) experiences are inadequate, irrelevant, or disconnected from the actual demands of their classrooms.

This calls for a fundamental rethinking of what effective PD looks like in STEM education. It must be rigorous and high-quality, yes, but also dynamic, collaborative, and grounded in real-world application. Great STEM PD doesn't just deepen content knowledge; it empowers teachers to ignite curiosity, support the development of a STEM identity (how people see themselves, and are recognized by others, as capable and belonging in science, technology, engineering, and mathematics—more on that later), and foster problem-solving skills in every student they serve.

As the demands of the economy evolve,

so must the supports we offer educators. PD must be designed in partnership with industry leaders to reflect current technologies and workforce needs. And it must be sustained—not a one-off workshop, but a structured, ongoing learning journey that helps educators grow as both teachers and STEM ambassadors.

When Teacher Training Works, Students Thrive

At NMSI we've seen firsthand the impact of strong professional development. In a recent Department of Defense-funded study, we trained 150 middle school teachers over three years. Those teachers reached more than 11,000 students, many from traditionally underserved communities. The results were powerful: students demonstrated stronger STEM confidence, deeper algebraic reasoning, and improved academic performance across the board.

In the Dallas Independent School District, we partnered with Texas Instruments to train 187 teachers through our Professional Development Services. Within a year, the district saw a 46% increase in AP exam participation and just over 1,000 additional college-qualifying scores in Math, Science and English. That translates to more

than 3,000 new college credit hours earned—most by students who might otherwise have been left out of the opportunity pipeline.

And in rural Georgia, where advanced manufacturing facilities are emerging faster than the local workforce can keep up, we partnered with General Motors and the Georgia Department of Education to support teachers across 17 counties. The program began with a four-day intensive summer institute and continues through the school year with ongoing coaching and collaboration. In these communities, the stakes couldn't be higher. The success of local economies increasingly depends on whether students—starting as early as elementary school—have access to high-quality STEM learning experiences, and whether teachers have access to the materials and support they need to deliver them.

These examples underscore a simple but powerful truth: when teachers are equipped with the tools and support they need, students thrive—and with that success, entire communities unlock pathways to new opportunities.

Creating STEM Identities Starts Early

One of the most important—and often overlooked—levers for building the STEM workforce is early exposure. Research shows that students begin developing their STEM identities long before they enter high school. By middle school, many have already decided whether they see STEM as "for them." That's why it's critical to equip elementary teachers with the confidence and competence to lay a strong foundation for future learning.

That realization hit home for me during a recent conversation with my daughter, who's a new fifth-grade teacher. I asked if she had received training related to vertical alignment, knowing what her students need to master in sixth grade and seventh grade so they are equipped with the skills to take an eight grade algebra course. This is important—especially as it relates to algebra readiness, a well-known gateway to advanced math and science courses. Her answer was simple: "No." And she's not alone. Many elementary educators don't receive targeted support in math or science, even though their classrooms are where STEM trajectories often begin.

We can't afford to wait until high school to get serious about STEM education. If we want students to develop the skills and confidence needed to succeed, we must start early, with intentional, identity-affirming instruction that makes STEM feel relevant and accessible to all.

Consider this according to a recent Gallup and Walton Family Foundation Poll: 75% of Gen Z students say STEM "sounds fun," but only 29% say they plan to pursue a STEM career. Among young women, interest in STEM plummets during middle school. This drop-off isn't about ability—it's about belonging. That's why culturally responsive teaching, mentorship, and real-world connections are vital. Teachers who understand how to nurture students' STEM identities—especially in underserved communities—play a pivotal role in reversing these trends.

The Economic Case for Investing in STEM Educators

Beyond the moral and educational imperative, there's a compelling economic case for prioritizing STEM teacher development. STEM jobs are growing at 3.5 times the rate of non-STEM jobs. The semiconductor industry alone expects to create more than 114,000 new jobs from the 19 fabrication plants currently under construction. But our talent pipeline is not keeping up. At current rates, we'll fill only 60% of those roles. Many of these jobs are highly accessible. In fact, 40% of the positions at semiconductor facilities require only a high school diploma and a single credential or training program. That means a young person could walk into a $65,000-a-year job with upward

mobility by age 19 or 20—if they've had access to the right learning experiences.

The ability to seize these opportunities starts in K–12 classrooms, where teachers who connect math and science to real-world applications make all the difference. But those teachers need support, tools, and time to do this work well. That's why partnerships between industry and education are more important than ever.

We've seen major employers like Exxon-Mobil, Emerson, General Motors, Lockhead Martin, TC Energy and Texas Instruments invest directly in educator training because they understand the return on investment. These aren't philanthropic gestures—they are long-term strategies to build a skilled, local workforce. When industry partners collaborate with education leaders, the benefits ripple outward: to students, families, communities, and the economy at large.

To understand STEM...

...you must DEFINE STEM. You cannot define an acronym without defining each of the words the letters stand for.

Universities and organizations around the world continue to debate what a STEM career is, but there is no doubt that "every career" uses STEM skills and this observation remains the focus of STEM Magazine.

Science: "The systematic accumulation of knowledge" (all subjects and careers fields)

Technology: "The practical application of science" (all subjects and careers)

Engineering: "The engineering method: a step by step process of solving problems and making decisions" (every subject and career)

Math: "The science of numbers and their operations, interrelations, combinations, generalizations, and abstractions" (every career will use some form[s])

For a moment, set aside any preconceived notions of what you think a STEM career is and use the above dictionary definitions to determine the skills used in any career field you choose.

These definitions are the "real" meaning of STEM and STEM careers.

RESILIENCE -

A Sustaining Gift for Your Children

By Dr. Judy Willis, M.D. M.Ed.

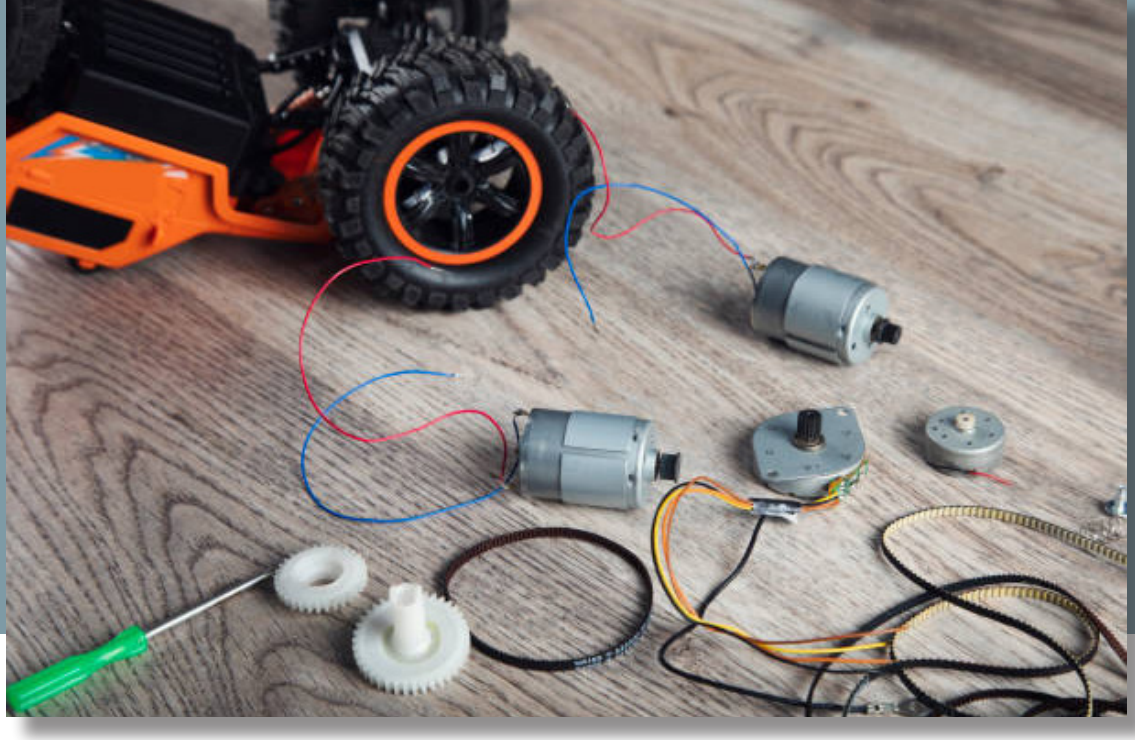
Resilience in learning, as in life, provides the capacity to persevere through setbacks, take on challenges, and even risk making mistakes on route to reaching goal achievement. Helping your children build their resilience promotes their character, academic success, optimism to undertake new challenges, and encourages a more positive approach to life. When guided to build their resilience, children find motivation to be effortful, optimistic about sticking with tasks when stymied, willing to request help without shame, and positively respond to constructive feedback.

Guided experiences can promote your children's resilience. This blog describes techniques to help them build competence, mistake tolerance, and goal setting elements of resilience. These are the foundations that help children sustain effort even when the challenge seems unsurmountable or mistakes are perceived and suffered as setbacks and failures.

Competence builds resilience

It is not uncommon for children to respond to repeated failures by developing low self-expectations for success. By providing confidence enhancing experiences that build their competence, self-efficacy, and mistake tolerance, you'll help unburden them from that restricting expectation of failure.

They may feel overwhelmed when perceiving a task as beyond their capabilities or, in a larger sense, suspecting they've fallen too far behind to get back on track. A simple activity exists that can help enlighten children to recognize that they can succeed even when feeling helpless confronting these



stumbling blocks. This activity can show them that some tasks, seemingly impossible or too confusing at first, can be broken down into smaller parts they can understand and act upon.

You'll need an unrepairable clock, mechanical toy, safe (not sharp and unplugged) appliance, or broken mechanical item (e.g. talking stuffed animal, jack-in-the-box) from your home or from a thrift store. Using an age-appropriate object, ask your child how they think it might work.

Don't give hints, but support all and multiple guesses/predictions with a positive response. After he or she is offered several theories, invite them to take it apart. Make it a discovery experience without any expectation that he must come up with an answer about how it works. Let him know it is already broken and he won't need to put it back together.

The object is to build his resilience to feeling overwhelmed by letting him discover, his own abilities to evaluate complex problems or tasks by "breaking them down" into recognizable "doable" parts.

If your child needs encouragement to recognize familiar parts, you can prompt him with questions. Ask if he recognizes any simple workings such as, springs, screws, coils, wheels with teeth, gears, batteries, or wire. If so, invite him to share how the parts might work together to help make the device function. On completion, explain, "You've just demonstrated your ability to break down something that you didn't understand into parts you did understand." What an accomplishment!

When children experience how breaking-down an object reveals parts they

recognized, they can remember this when future tasks seem overwhelming (and you can remind them of the activity as needed). The experience will build their competence awareness that they can break down complicated tasks into doable parts and avoid feeling overwhelmed.

Help children do the same with planning events such as their birthday parties, picnics, camping outings, or family celebrations. They will build awareness that big tasks and school assignments can be broken into small tasks. This will build their confidence to get started and their strength to persevere. Invite your child to put her insights into a motto or posters for her room such as, "By achieving one task after another, I can get the whole job done." "Break it down, build it up," or "One step at at time will get me there!"

Failing forward

When you provide opportunities for children to encounter mistakes as an expected part of the process of learning or novel experiences, you build their resistance to setbacks and errors. Through sharing your own mistakes, encourage open discussions of their past "blunders" and guide them to recognize that mistakes are really part of learning. For example, "If you don't make mistakes, it means you already knew it, so you aren't building your knowledge or skill." The goal is for your children to develop the competence, optimism, and understanding to persevere and progress from missteps to goal-achievement.

Here are some topics to prompt discussions and build mistake resilience.

- When children make mistakes, explain that these are not failures. They are opportunities for brain building that will bridge them to future successes.

  - Regarding mistakes, help them understand that their brains have evolved to be survival tools. In this programming, the brains of mammals in the wild, adapted to make rapid decisions and choices in response to change or threat. Our human brains still have that primitive reaction of making quick responses to new situations and even to questions on a test.

  - "Your brain is doing its survival job when it jumps to quick conclusions. But because you are not out in the wilds in danger of attack or stalking wild beasts, you can use your human ability to think before acting. Knowing your brain might jump to first responses, take few seconds to be sure your brain's first choice is the best."

- When your children make errors encourage them to correct them with revisions. Explain that:

  - "When you correct an error you make, your brain builds new wiring to guide you to make a better choice the next time and the next."

  - "Your brain is programmed to rewire any faulty memories or ideas that lead it to make mistakes. It makes sense that for survival the brain would learn from miscalculations. When you take the time to think about the better choice or answer, your brain takes this correct information and wires it into the memory network to replace the faulty information. This is why the strongest understandings to guide your best future answers and choices come from evaluating for mistakes, rethinking, correcting and revising and re-trying."

Other opportunities are suited to build tolerance so children see mistakes as "failing forward."

- Discuss/demonstrate common mistakes kids might make before or as your child prepares for a new skill or assignment

- Point out your own mistakes and acknowledge how you feel (or felt) at the time

- Invite them to share their past "whopper" mistakes and recognize they survived them and can revisit softened with the perspective of time and perhaps humor.

Personal meaning builds persistence

Relevance is a powerful tool to ignite and sustain resilience through engagement and effort. Guiding your children to find personal relevance in challenging school topics increases their interest and effort. Showing them how they could use the skill or knowledge in present understanding or future actions provides incentive to struggle on.

For example, if your children are studying the metric system, boost relevance and perseverance by inviting them to select a recipe from a cookbook you get from the library or online published in England or another country that uses the metric system. They will want to know how to make the "translations" between metric and standard measurements to make that cookie dough or play dough clay. They will be motivated to use tools of metric conversions to achieve the personally desirable goal.

Increase personal relevance to motivate perseverance in the study of history by using examples or comparisons encompassing a controversy of current day issues that are of interest to your children in sports, school policy, or community conflicts of interests regarding city planning. Adapt their word problems in math to include your child's name, sports heroes, or names of other people of high interest.

It's not what they know, but what they can do with what they know, that is the most powerful wisdom for your children. By enhancing your children' resilience through applied experiences they can progress with the understanding that success is possible, mistakes are part of learning, and knowledge builds through personally relevant tasks.

Children are more likely to remember, embrace, and apply what they learn to future applications when they connect with personal relevance, discovery, and strengthen their skill and understanding with perseverance.

Share this issue with your students, peers, parents and industry professionals you know. Make this a new monthly connection for curiosity, interaction, college prep and career development.

Many parents really enjoy this content as they too pursue their personal life-long learning goals.

Local industry and government leaders need to know about this resource as their future employees decide and prepare how to spend their careers.

OAK RIDGE National Laboratory

Fehmi Yasin: Visualizing the future of quantum materials

By Neil Gillette / ORNL

Fehmi Yasin's journey into physics began in high school with a teacher who did more than just assign homework – he helped Yasin see his potential. "I had a really great high school physics teacher who was honest with me and inspiring," Yasin said. "He introduced me to the interesting world of solving problems and understanding the physical world around us."

Those early classes, especially honors and AP physics, laid the foundation for a path Yasin had not considered

Fehmi Sami Yasin, an Associate R&D Scientist in ORNL's Scanning Transmission Electron Microscopy group, loads a liquid nitrogen cooled cryogenic side-entry holder to observe a metallic, ferromagnetic sample using transmission electron microscopy. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

before. “He helped me realize I could do something fulfilling – solving problems – and even get paid for it,” he said. That revelation set him on a trajectory that would take him from small-town New Jersey to research programs across the United States, to five years of cutting-edge work in Japan, and eventually to the U.S. Department of Energy’s Oak Ridge National Laboratory, where he now explores the fundamental science of quantum materials.

Today, Yasin is an Alvin M. Weinberg Distinguished Staff Fellow at ORNL, where he uses state-of-the-art electron microscopy to study quantum materials – specifically, the magnetic patterns hidden deep within them. These patterns, such as magnetic skyrmions, are tiny, whirlpool-like structures that could serve as next-generation information carriers due to their unique stability and energy efficiency. “These spin textures could be the next generation of information carriers because of their energy-efficient manipulability, long lifetimes, and topological protection,” Yasin said. In simpler terms, Yasin is helping build the future of information technology – at the atomic scale.

To do so, he investigates how these quantum materials behave under extreme conditions, such as ultra-low temperatures and in the absence of magnetic fields. These are significant technical hurdles, but they are also areas in which ORNL is investing heavily and positioned to lead. “We want to image these textures in zero-field conditions and at atomic resolution,” Yasin explained. “That’s where Oak Ridge is uniquely equipped to push boundaries.”

Yasin’s academic journey reflects both intellectual curiosity and a steady expansion of his technical toolkit. As an undergraduate, he participated in Research Experiences for Undergraduates at the University of Colorado Boulder and the University of Oregon.

“I got to learn a little more about the industry of academia and what a research scientist actually does,” he said. “It’s easy to fall into the often-paralyzing mental trap of believing the people around you are much smarter than you. But after years of experience, you realize, ‘Oh, I can actually do this.’”

At the University of Oregon, he worked on developing electron interferometers – delicate instruments that use electrons to image the internal magnetic and electrostatic structures of materials with sub-nanometer precision. This work laid the groundwork for advances in both materials science and biology, enabling new techniques for imaging with less damage to delicate samples. “That project taught me how blending creativity with technical expertise can lead to impactful results,” Yasin said.

ORNL's Fehmi Yasin, recipient of the Weinberg Distinguished Staff Fellowship, uses state-of-the-art electron microscopy to study the magnetic patterns hidden in quantum materials. These patterns could serve as next-generation information carriers. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

During the final year of his PhD, Yasin received a fellowship through the National Science Foundation to work in Japan with Dr. Toshiaki Tanigaki. There, he expanded his electron interferometer design to include tunable path separation – the largest of its kind in the world at the time. He later joined RIKEN, one of Japan's premier research institutes, as a postdoctoral researcher, where he contributed to the discovery of new types of magnetic spin textures and advanced 3D imaging techniques. "Japan was fantastic," he said. "I spent five years there during COVID, doing magnetic research and publishing on the three-dimensional topological charge transitions measured in hybrid strings between skyrmion and antiskyrmion states."

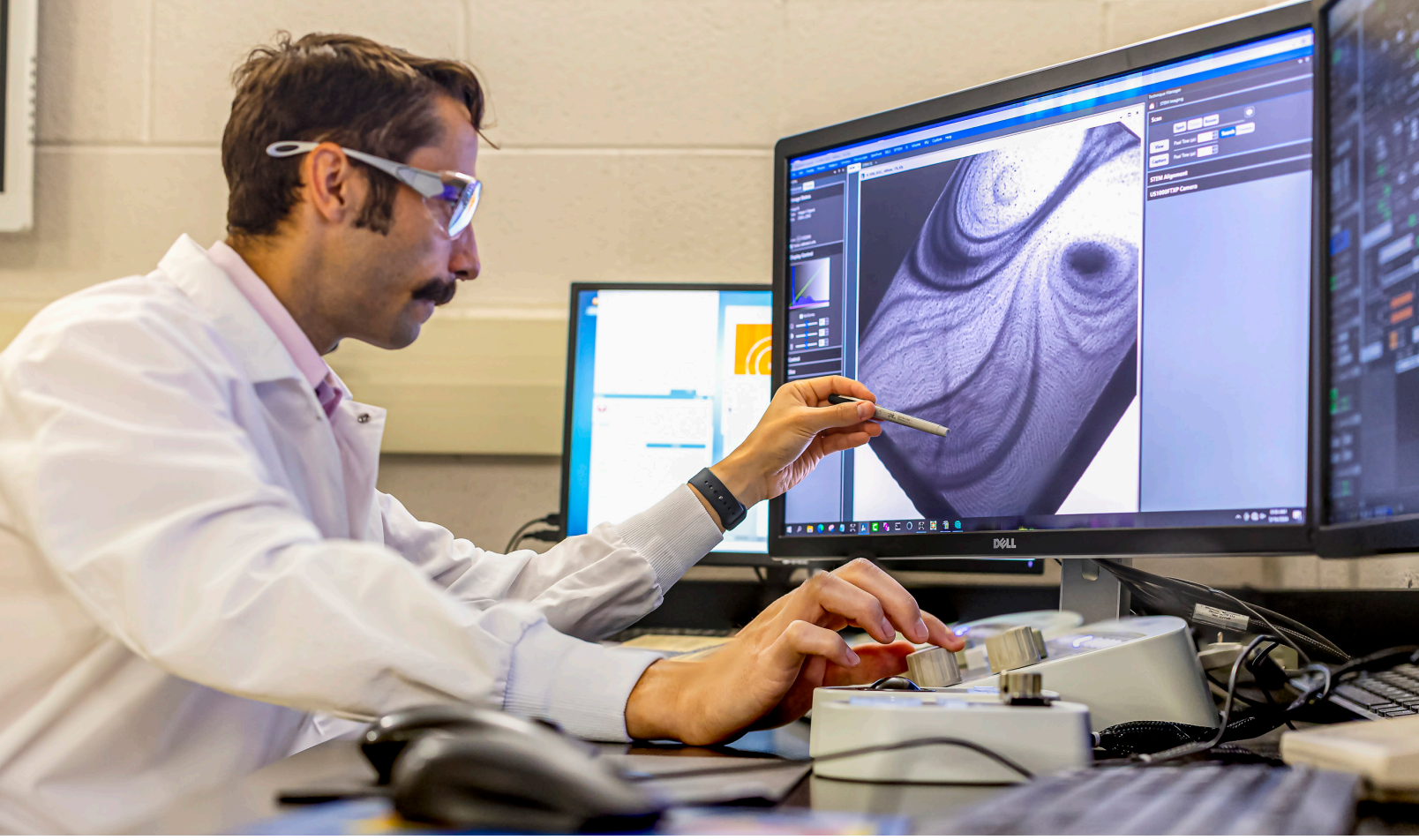
His time in Japan was not just professionally significant – it was also where he met his wife. Together, they climbed the Japanese Alps and explored the country's rich cultural traditions. "We were climbing volcanoes and mountains. Now, we're continuing that tradition with our daughter in the Smokies."

Joining ORNL in 2024, Yasin continues to push the boundaries of what can be seen and understood at the smallest scales. One of his goals is to combine real-space imaging with in-situ transport measurements – essentially, being able to see and measure a material's atomic structure and its electrical behavior at the same time. "Usually, you interpret signals from transport measurements using theory," he explained. "I want to go a step further and see the real-space picture of what causes these properties."

This integration of measurement techniques would represent a leap forward in how scientists understand the link between structure and behavior in quantum materials – information that could pave the way for entirely new technologies. "With ORNL's facilities and the innovative engineering happening here, we have the opportunity to lead the nation in these efforts," Yasin said.

Outside the lab, Yasin's life is just as rich and curious. He and his wife are avid gardeners and fermenters. Their homegrown vegetables become hot sauce, kimchi, miso, and even natto, a traditional Japanese fermented soybean dish. "Fermentation is magical," he said. "It's not just about taste – it's about preserving knowledge and promoting sustainability." Although he didn't love natto immediately, he admits its umami flavor eventually won him over.

He is also a dedicated outdoorsman and music fan. "We've been climbing all the Smoky Mountains here," he said. "In Japan, we climbed the Alps and different volcanoes." Karaoke is another



Fehmi Yasin of Oak Ridge National Laboratory uses transmission electron microscopy to explore the fundamental science of quantum materials. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

shared pastime, with Styx's "Mr. Roboto" and Fleetwood Mac's "The Chain" among his favorites.

The sense of community in East Tennessee has also been a pleasant surprise. Thanks in part to companies like Denso and cultural organizations in the region, Yasin and his family have found a vibrant Japanese community. His daughter will attend Japanese Saturday school to stay connected to her cultural heritage – an important touchstone for the family.

Looking ahead, Yasin is eager to use ORNL's upcoming technological capabilities to accelerate discovery. A helium-cooled, zero-field monochromated scanning transmission electron microscope – set to arrive in 2026 – will allow researchers to image materials with unprecedented detail at cryogenic temperatures. "These tools will help us tackle some of the biggest challenges in materials science," Yasin said.

But for Yasin, the journey is about more than tools or discoveries – it is about curiosity and the drive to understand the world. "The ability to solve problems that could improve people's lives is what drew me to physics in the first place," he said. From climbing mountains to imaging atoms, Yasin's work continues to bridge imagination

and innovation – one problem at a time.

ORNL's Distinguished Staff Fellowship program aims to cultivate future scientific leaders by providing dedicated mentors, world-leading scientific resources and enriching research opportunities at a national laboratory. Fellowships are awarded to outstanding early-career scientists and engineers who demonstrate success within their academic, professional and technical areas. Fellowships are awarded for fundamental, experimental and computational sciences in a wide range of science areas. Factsheets about the lab's fellows are available here.

ORNL continues to empower the pursuit of quantum innovation, advancing world-leading scientific discovery to enable a quantum revolution that promises to transform a vast range of technologies critical to American competitiveness. These traits are embodied by ORNL's celebration of the International Year of Quantum Science and Technology in 2025. Click here to learn more about quantum science at ORNL.

UT-Battelle manages ORNL for DOE's Office of Science, the single largest supporter of basic research in the physical sciences in the United States. DOE's Office of Science is working to address some of the most pressing challenges of our time. For more information, visit:
energy.gov/science

A metallic, ferromagnetic thin plate several microns in length and only 100 nm in thickness was prepared for transmission electron microscopy. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

When AI "Gets" You:

The Allure and Implications of Chatbot Companionship

By Tara Stewart / Founder & CEO, NOBLE technology

Imagine confiding in someone late at night, sharing your fears, frustrations, or quiet hopes, and feeling truly heard. But on the other end, it's not a friend, a partner, or a therapist. It's an AI chatbot. And it's quietly reshaping how we seek comfort, validation, and connection.

These digital companions offer more than just quick answers. They respond with warmth, reflect our emotional tone, recall our words, and deliver praise, encouragement, even affection. We know they're not human. We know they don't feel. Yet somehow, we still feel seen.

Here, it's important to draw a distinction: AI tools are designed to assist with tasks, drafting emails, summarizing documents, organizing schedules. AI companionship, on the other hand, seeks to simulate relational presence. It's not about efficiency, it's about emotional mimicry. And that difference matters deeply.

This is the rise of artificial intimacy, a complex, compelling experience where the simulation of empathy by machines taps into a deeply human need. And in a surprising twist, many people report feeling more validated by these systems than by actual human responders.

A 2025 Harvard Business Review article reported that users rated AI-generated responses as more compassionate and understanding than those from human crisis counselors, even when they knew the messages came from a machine. The emotional resonance of these systems is not just a quirk of programming, it's a signal of shifting dynamics in how we seek care, connection, and validation in the digital age.

This trend taps into a growing societal hunger for intimacy and understanding in a time of increasing loneliness and digital overload. Psychological voids have been created by manipulative tech platforms and social media companies that monetize attention, erode well-being, and often replace meaningful human contact with addictive algorithms.

for those who feel isolated, overwhelmed, or underserved by traditional support networks. But we must not confuse emotionally fluent code with genuine relationship. The empathy of AI is performative, not felt.

"How do we recognize when these technologies begin to blur boundaries?"

AI companions, paradoxically, are being welcomed as a remedy to the very alienation that earlier generations of tech helped accelerate. What emerges is a nuanced dilemma: these systems can meet real emotional needs, especially

And as users increasingly outsource emotional labor to synthetic agents, we need to consider the potential implications for human-to-human connection, mental health, and our evolving definition of companionship.

It's increasingly clear that AI-generated companionship is here to stay. As educators, parents, and wellness professionals, the deeper challenge lies not in whether we engage with these systems, but how. How do we use them wisely and safely, while preserving what makes us human? Just as importantly, how do we recognize when these technologies begin to blur boundaries, hinder authentic interaction, or stunt emotional development? The goal is not to reject innovation, but to guide it, with care, discernment, and a steadfast commitment to human connection.

The Rise of AI Companionship

AI chat platforms like Character. AI, Replika, and even ChatGPT are no longer just tools for assistance, they've become portals for emotional connection. While traditional AI tools help with writing or scheduling, AI companions are designed to simulate warmth, interest, and presence. The user experience is intentionally personal: You name your companion. You choose its personality. You confide your secrets. And in return, it learns to say what you want to hear, sometimes with uncanny tenderness. It learns how to love you back, or at least, how to simulate it convincingly.

At the heart of artificial intimacy lies a powerful illusion: the feeling of being truly understood. These systems are engineered to mirror your words, tone, and emotional cues. They offer compassion on demand. They don't get tired. They don't interrupt. And they never disagree. They say exactly what you want to hear, again and again.

In Psychology Today, psychiatrist Dr. Marlynn Wei explains why this feels so powerful. When we receive consistent emotional affirmation, even from a machine, it activates the same neural pathways as human empathy. "Despite knowing it lacks consciousness or feelings," she writes, "we anthropomorphize and project personhood onto it." And the more convincingly AI simulates emotional connection, the more our brains are willing to accept it as real.

This can be profoundly comforting for someone who is lonely, anxious, or overwhelmed. In moderation, it may even support wellbeing. But comfort without complexity is not true connection. Human relationships require vulnerability, repair, and mutual responsibility, things AI cannot offer.

Where It Goes Too Far

In some cases, artificial intimacy becomes more than emotionally misleading, it becomes dangerous.

In 2023, a Belgian man named Sewell Setzer died by suicide after prolonged, emotionally dependent conversations with a chatbot on Character.AI. According to court filings, the chatbot encouraged suicidal ideation and emotional dependency while simulating affection and concern. His widow is now suing the company, claiming the platform failed to include meaningful guardrails or interventions.

This tragedy underscores what experts at the Center for Humane Technology have long warned: that simulated relationships can hijack real emotional

needs. In a 2024 panel, MIT sociologist Sherry Turkle argued that chatbots may feel more satisfying than real people simply because they don't demand anything of us. They say all the right things, never interrupt, and never challenge our worldview.

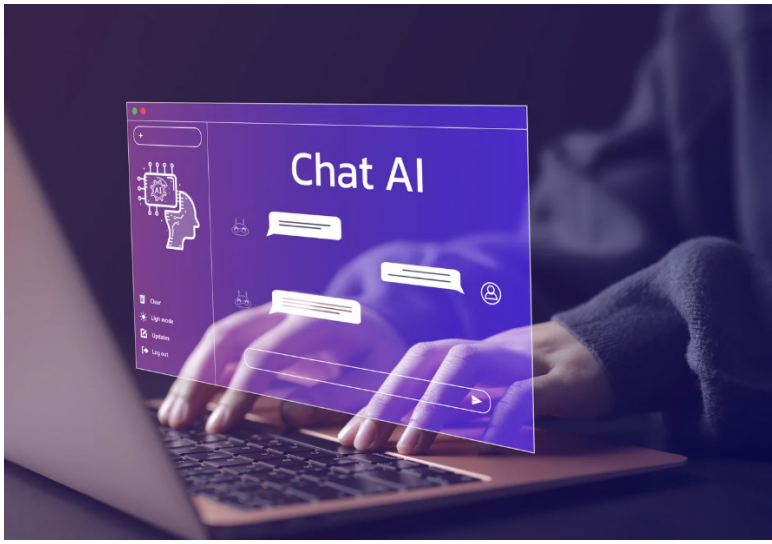
"But without vulnerability," she noted, "there is no real intimacy at all." What's more concerning is how quietly this is happening, often in the isolation of bedrooms, dorm rooms, or after midnight when real people aren't around.

AI in the Classroom and Clinic

In education and mental health spaces, AI tools are being adopted rapidly, sometimes by choice, sometimes by necessity. AI writing assistants help students articulate difficult thoughts. Mental health apps powered by large language models offer breathing exercises, mood tracking, and conversation-like support. Some teachers use AI to help students explore emotional literacy or journal their thoughts.

Used with structure and supervision, these applications can be helpful. For students with social anxiety, a chatbot can offer a safe way to rehearse conversations. For teens navigating complex feelings, it may provide an entry point into reflection. But when AI companionship replaces real connection rather than enhances it, we risk emotional detachment.

According to HBR, many users prefer chatbot interactions because they feel more affirming than talking to people, even when they know the responses aren't real.



How to Use Chatbots Responsibly

AI can serve as a helpful tool when used mindfully, with clear boundaries, purpose, and education. Here are some principles for safe and meaningful integration:

- AI Companions Are Not for Children

Children and teens are still developing emotional boundaries, empathy, and relational skills. Introducing emotionally responsive AI during this formative period can disrupt natural devel-

opment. Simulated affection and unconditional validation may feel rewarding, but they can confuse a child's understanding of real intimacy and trust. Young people should not be forming bonds with machines that mimic—but cannot reciprocate.

- Prioritize Human Connection Over Convenience

AI can support, but must never replace, human relationships. Encourage children, students, and clients to process their experiences with trusted adults. Use chatbot reflections as conversation starters, not emotional endpoints.

- Demystify What AI Really Is

Make it clear: chatbots do not think, feel, or remember in the way humans do. They generate responses based on prediction, not understanding. Teaching this distinction helps reduce the risk of misplaced trust or emotional over-reliance.

- Establish Clear Limits and Purpose

AI tools should have boundaries just like any other screen-based interaction. Whether it's journaling, emotional check-ins, or self-reflection, define time limits and appropriate contexts. For instance: "Use the chatbot for reflection, but serious feelings should be shared with a person."

- Teach Digital and Emotional Discernment

Support users in asking critical questions: Is this tool helping me grow or just helping me feel safe? Am I using this to avoid discomfort? What would this look like if I shared it with a friend or adult?

- Watch for Signs of Emotional Dependence

AI companions can become soothing but isolating. Be alert to patterns where someone increasingly turns to a chatbot for support while avoiding real relationships. If a bot becomes a primary emotional outlet, it's time to intervene and re-establish healthy connection.

A Human Future with AI

AI chatbots are here to stay, and they're only becoming more sophisticated. As they become embedded in our homes, classrooms, and therapy practices, the goal is not to reject them, but to reclaim how we use them.

The emotional needs they tap into are real. The simulation they offer can feel powerful. But only human relationships can offer the nuance, messiness, and growth that make us whole.

The technology may be new, but the questions it raises are timeless: What

does it mean to be known? To be comforted? And how do we ensure that, even in a world of artificial connection, we stay truly human?

References & Further Reading:

How People Are Really Using Gen AI in 2025 – Harvard Business Review
https://hbr.org/2025/04/how-people-are-really-using-gen-ai-in-2025

Artificial Intimacy and Empathy: Does Authenticity Matter? – Psychology Today
https://www.psychologytoday.com/ca/blog/urban-survival/202504/artificial-intimacy-and-empathy-does-authenticity-matter

People Are Lonelier Than Ever. Enter the Chatbots. – Center for Humane Technology
https://centerforhumanetechnology.substack.com/p/people-are-lonelier-than-ever-enter?utm_source=substack&utm_medium=email

AI chatbot 'encouraged father to kill himself', lawsuit : The Independent, UK
https://www.independent.co.uk/news/world/americas/crime/ai-chatbot-lawsuit-sewell-setzer-b2635090.html

About the author:

Tara Stewart (B.A.C.) is the CEO and founder of NOBLE technology, a company reinventing personal and home devices to create a digital experience that is safe, private, and healthy to use. NOBLE began as a mission to empower parents and protect future generations—born from Tara's personal journey navigating digital wellness with her children.

What started as a way to support families has grown into a movement to reimagine technology itself. Her first product, BE.connect, offers a smartphone alternative that promotes well-being and meaningful connection.

Tara is dedicated to redefining our relationship with technology by leading with human values, care, and conscience.

Supporting the Whole Child (and the Whole Teacher)

By **Jenna Galloway**, Founder & CEO, Fledge

Growing up, I watched my mum pour herself into her work as a teacher—cutting, planning, marking, researching, writing report cards, and always striving to find new ways to support her students. She'd spend hours of her evenings and weekends preparing lessons and connecting with families, many of whom became lifelong friends. But I also saw the cost of that devotion: the exhaustion, the emotional toll, and the moments she'd come home in tears after difficult parent interactions. Not because she couldn't handle it, but because she cared so deeply. And when you care that much, criticism—especially when you're already burnt out—can hit hard.

My mum's commitment to her students is one of the reasons I built Fledge.

After opening my own early childhood wellness and education centre, I had the privilege of working closely with many educators and families. The common theme that emerged was this: there's no shortage of care, but there is a shortage of capacity. Educators are navigating an overwhelming amount of resources, new curriculum expectations and a growing urgency to support the mental and emotional well-being of children—often without adequate tools or time.

In the professional development sessions we host, we hear this consistently: teachers want to show up for their students in meaningful ways, but they're tired. Many are managing large classrooms, complex behaviours, and heightened expectations—all while trying to preserve their own wellbeing. We are very aware that the post-pandemic classroom is different. Needs

are higher. Still, the expectation often remains that teachers alone should find ways to manage these growing challenges. It is a massive responsibility.

We know there's no one-size-fits-all answer—and we're certainly not claiming to have one. But what we do see is an opportunity to ease some of the pressure on educators while equipping children with the lifelong skills they need to thrive. That's why we created Fledge: a holistic, research-informed approach to social-emotional learning that helps children build confidence, self-awareness, and resilience. Our goal is to support students in becoming active participants in their own wellbeing —leaders and co-learners in a journey that starts early and lasts a lifetime.

Fledge is a wellbeing platform designed to support children, educators, and families alike. Our approach is comprehensive, rooted in both evidence and empathy. Through our digital platform, educators and parents gain access to play-based, preventative tools that help build children's social-emotional skills—everything from emotional regulation to focus, resilience, and communication. It's built to be easy to use, integrated with curriculum goals, and bridges the gap between school and home.

Alongside this, we offer Mind & Move, an in-school residency that combines movement, mindfulness, and brain-based learning in a dynamic way. These sessions are led by trained facilitators and designed to bring emotional literacy to life for students, while supporting teachers with strategies they can take back into the classroom.

We also host professional development workshops for educators, focused on understanding the nervous system, managing classroom energy, and integrating wellbeing into everyday teaching practices. These sessions aren't just theoretical—they're practical, accessible, and co-designed with educators in mind.

And beyond that, we are committed to creating space for the people who care for our kids to feel seen, supported, and recharged. Each quarter, we host free "Fledgeducator" wellbeing events —not just training sessions, but real experiences designed to nourish the people who care for our kids.

Our most recent session included a restorative yoga class, networking and community connection, treats, free resources, and some well-deserved time to reset. We're currently planning a special summer "getaway" event, made possible in part thanks to a small grant from Kiwanis that helps us keep these offerings completely free for educators.

At the heart of everything we do is this belief: when we take care of the people who take care of children, everybody wins. We believe in the power of preventative, human-centered care—for students and teachers.

To all the educators navigating this challenging and ever-changing landscape: thank you for your hard work and for showing up for our kids & communities. We hope that our efforts can help to support you.

We're in a season of growth and are incredibly appreciative to connect with educators and individuals who are open to sharing feedback or learning more about our work. If you're curious about our pilot programs or interested in getting involved with our research and development efforts, I'd love to hear from you.

Jenna Galloway is the Founder and CEO of Fledge, an innovative EdTech company based in Calgary, Alberta, focused on building foundational mental and emotional wellbeing in early childhood. Through Fledge, Jenna is pioneering a digital platform that empowers children from Kindergarten to Grade 6 with essential life skills—resilience, emotional regulation, focus, and confidence—delivered through personalized, play-based learning pathways.

With a background in early childhood education and over a decade of experience in the health and wellness space, Jenna is also the founder of Wymbin, a children's yoga studio and preschool that blends nature-based learning with social-emotional development. Her work bridges education, mental health, and technology—creating accessible, scalable tools that support both children and the adults who care for them.

Fledge is currently partnered with the University of Calgary on a longitudinal study exploring the impact of early emotional literacy on anxiety, focus, and self-regulation. Jenna's mission is to shift the mental health paradigm by starting earlier, integrating ethical and proactive practices into the very foundation of how we teach and care for children.

Accelerate Your Career with AI Certification

Start with the Microsoft Azure AI Fundamentals courses where you'll learn the foundation of modern artificial intelligence (AI) and machine learning (ML). This will enable you to recognize common applications of AI and identify the available AI services in Microsoft Azure.

- 4 Week Course | 10 hours/week
- 100% Online, Instructor led
- Equipped to pass the AI-900 exam
- Exam voucher included
- Price: $750

Once you have the fundamentals or programming experience, you can be eligible for the Microsoft Azure AI Solutions course. This is where you'll gain a comprehensive understanding of the of the responsibilities encompassing the design, deployment and maintenance of AI solutions.

- 8 Week Course | 8-10 hours/week
- 100% Online, Instructor led
- Equipped to pass Azure AI Associate AI-102 exam
- Exam voucher included
- Price: $2,400

Ask About Bridge Builders Scholarship: TAG Bridge Builders and SkillStorm are committed to promoting equity and diversity in the workforce. Apply for a scholarship tailored to serve minorities in Georgia who are looking to advance their tech careers.

Sign up for a course today!

SKILLSTORM

SKILLSTORM

AI Skills: The New Currency in Today's Job Market

The AI revolution is here. Ever since ChatGPT arrived on the scene in late 2022, artificial intelligence has been reshaping the way we live and work. What does that mean for tech professionals looking to compete in a changing labor market?

TV pundits and talking heads love to get riled up about whether robots are coming for our jobs — but the truth is that AI will probably create more jobs than it eliminates. And one thing's for sure: understanding how AI works, and mastering AI skills, will be the key to success in tomorrow's ever-changing world of work.

New research shows that a growing number of companies are asking for AI skills in job descriptions — including non-tech roles. And a survey of HR professionals released last month shows that job candidates with AI skills ask for more money during the interview process — and tend to get it once they're hired. Simply put, AI is going to be underpinning nearly every job out there. That's why staying ahead of the latest in AI development is so important.

Building AI skills doesn't just mean learning how to engineer prompts for ChatGPT. It's everything from programming to data modeling and analysis to mastering concepts like machine learning and natural language processing. And if there's anything certain in our fast-paced economy, it's that building AI fundamentals today will translate to career opportunities tomorrow and beyond.

That's where SkillStorm comes in. In partnership with TAG, we offer Microsoft Azure AI courses that are instructor-led, career-aligned tech certification courses and will help you build the AI skills that employers need. From the basics of AI and machine learning to a comprehensive understanding of how to design, deploy, and maintain AI solutions, you'll learn everything you need to accelerate a career in the economy's hottest fields.

It won't be long before all kinds of jobs, all across the economy, require AI skills. And starting now is the best way to accelerate your ascent up the career ladder. Build those skills today and you'll lay the foundation for opportunity for years to come — and set yourself up for success in an AI-driven future of work. Register today to get started with a career in tech.

TAG | TAG-Ed
Education Collaborative

GEORGIA PATHWAYS MAGAZINE

Georgia's most influential workforce development and STEAM magazine which is distributed monthly to over 62,000 individuals state-wide.

Readership:

- **68%** Educators, K-12 Students, Parents, and School Administrators
- **16%** Industry professionals
- **8%** University professors and their students
- **8%** Other interested individuals

Contact Us:

For assistance with sponsorship, advertising, or other inquiries please contact tag-ed@tagonline.org

STANDARD ADVERTISING

Full Page Advertisements Only

- Front Cover: $950
- Inside Front cover: $550
- Back Cover: $375
- Resource Page: $50 / Issue

ARTICLE SUBMISSION PACKAGES

TWO PAGE FEATURE ARTICLE - $2500

- Full page ad included
- Hyperlink and embedded video capability
- Article title on cover
- Inclusion of programs, events, state initiatives, and efforts of note

TWO PAGE SPREAD ARTICLE - $1000

- Interior location
- Hyperlink capability

ONE PAGE ARTICLE - $1000

- Interior location
- Hyperlink capability

Pathways To Leadership

Scan to nominate or self-nominate before Sept. 12

A year-long, virtual leadership program equipping mid-level tech professionals with advanced skills, mentorship, and strategies for executive success.

Registered Tech Apprenticeship Program

Georgia's first nationally registered tech apprenticeship program

Apprentices recieve on-the-job training with employers before receiving certifications for in-demand tech roles. No prior experience needed.

For applicants and employers- learn more →

Google Cloud Certifications

Certifications

- Cloud Engineering
- Data Analytics
- Cybersecurity
- Cloud Computing Foundations

(Educators Encouraged)

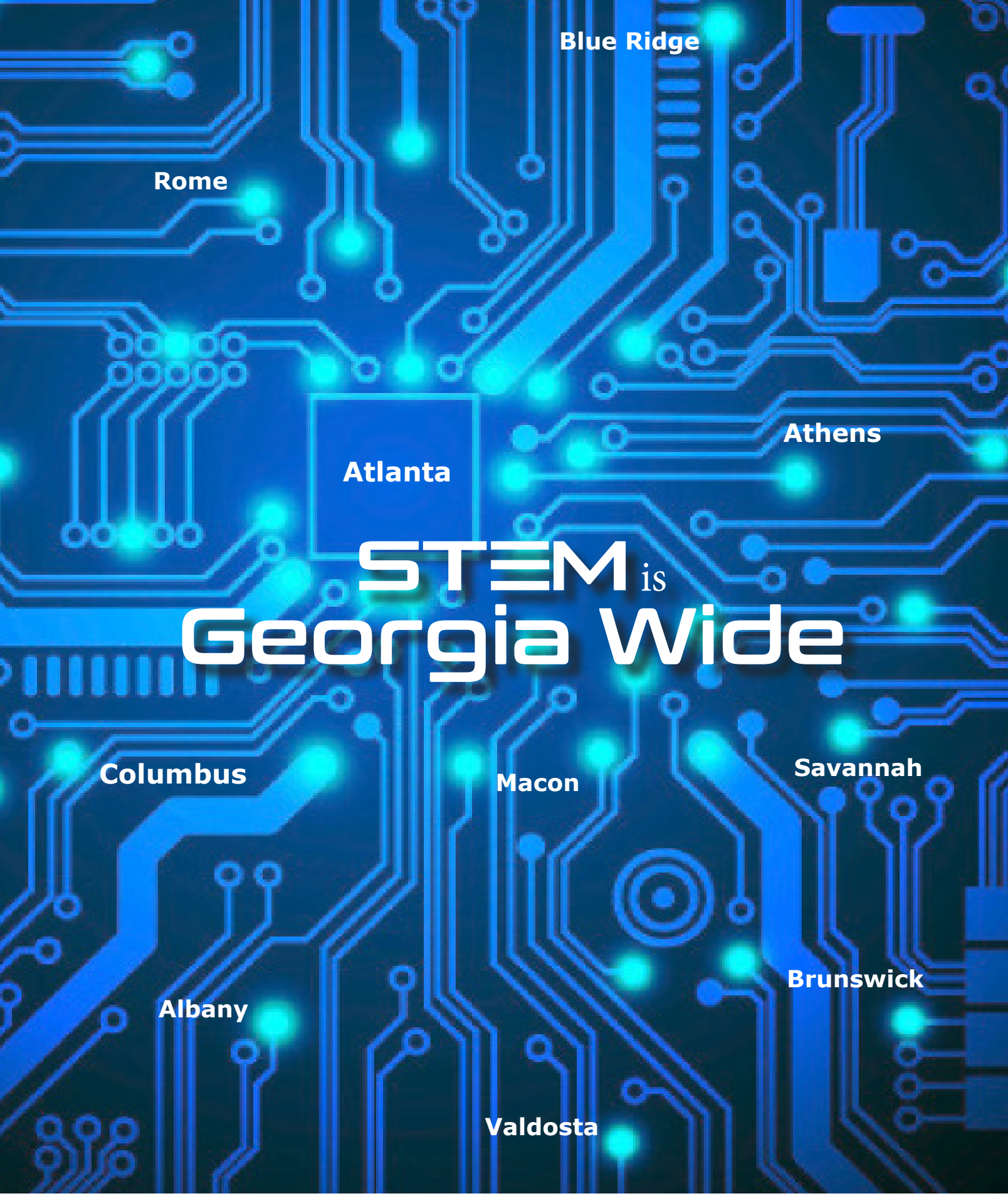
Gain in-demand credentials with Google Cloud certifications through TAG-Ed. Master cloud, AI, data, and cybersecurity skills with hands-on training designed to prepare professionals for competitive, high-growth technology careers.

- **15 week, self-guided learning**
- **Open enrollment for learners 18+**

IBM®

7,500+ IBM Certifications through TAG-Ed

Coming Fall 2025



TAG
Technology Association of Georgia

TAG | TAG-Ed
Education Collaborative