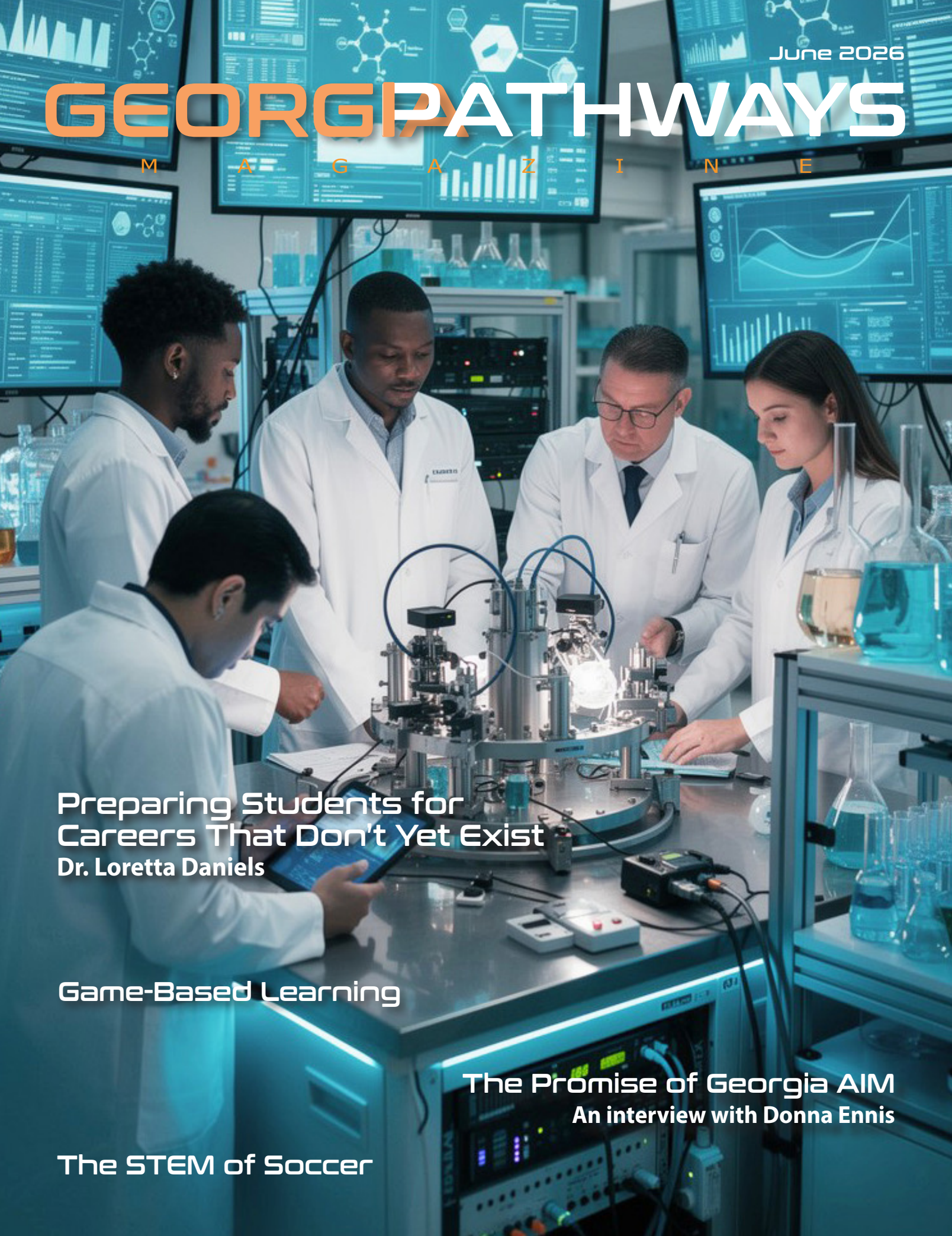
June 2026

GEORGIA PATHWAYS

MAGAZINE



Preparing Students for Careers That Don't Yet Exist

Dr. Loretta Daniels

Game-Based Learning

The Promise of Georgia AIM

An interview with Donna Ennis

The STEM of Soccer

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.

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Welcome to the June 2026 edition of Georgia Pathways Magazine, a source for ideas, innovations, and the current state of the workforce driving Georgia's future.

As Georgia continues to attract businesses and investors, demand for skilled workers grows. As of last month, state leaders have reinforced how economic growth depends on workforce talent and the expansion of opportunities for learners across the state. Therefore, accessible education, practical experience, and transferable skills remain the foundation for the success of all Georgians. The articles featured in this edition focus on innovative educational practices, experiential learning, and the reinforcement of cognitive and emotional skills that support long-term success.

From "Game-Based Learning" to "The STEM of Carpentry," these articles remind us that STEM education extends beyond traditional classroom settings. By providing learners with virtual experiences and hands-on learning that mirror industry environments, learners practice problem-solving, precision, and technical expertise, demonstrating the connection between STEM competencies and hands-on professions.

In celebration of the World Cup, "The STEM of Soccer" illustrates how STEM principles are applied both on and off the field, creating a competitive edge at every level of the game.

TAG
Technology Association of Georgia

Through "Guiding Students to Emotional Regulation", educators can support student well-being and academic success as it explores neuroscience pathways and adolescent psychology. Complementing this discussion, "The Brain Science of Test Performance" examines how stress and anxiety affect information recall and offers research-based perspectives on how to help learners perform more effectively.

These topics reinforce an important reality: workforce readiness is built through a combination of technical skills, hands-on experience, and the cultivation of strong character. By investing in innovative learning approaches, Georgia can create stronger pathways to new opportunities and help prepare our future workforce to succeed in a changing economy.

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.

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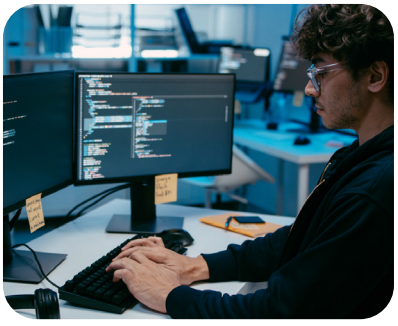

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To understand STEM...

...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.

Preparing Students for Careers That Don't Yet Exist

By Dr. Loretta Daniels

"The question is no longer whether students will use artificial intelligence in their careers. The question is whether they will be prepared to use it responsibly, effectively, and ethically."

During the past several years, TAG Education Collaborative's staff had the opportunity to work with employers, educators, workforce development leaders, and thousands of students across Georgia. Whether we are communicating with a superintendent in rural Georgia, a manufacturing executive in metro Atlanta, or a high school student participating in a STEM internship, the conversation often returns to the same question: How do we prepare students for future careers?

The answer is more complex than updating a curriculum or introducing a new technology platform. The future workforce will require technical skills, but it will also demand adaptability, resilience, critical thinking, communication, and the ability to learn continuously throughout one's career.

CAREER EXPLORATION THROUGH GAME-BASED LEARNING

One of the most exciting developments I have observed is the growing use of interactive technologies to introduce students to career opportunities.

At TAG Education Collaborative, we are seeing this firsthand through Georgia AIM and other workforce development initiatives. Through support from Georgia AIM, we have partnered with LEGO Education to provide hands-on STEM experiences that expose students to engineering, design thinking, automation, and advanced manufacturing concepts. Students are not simply learning about careers. They are actively solving problems, building prototypes, and experiencing how STEM concepts apply in real-world settings.

For many students, particularly in underserved and rural communities, these experiences provide exposure to careers they may not otherwise encounter. Technology cannot replace hands-on learning, but it can open doors and expand awareness.

THE VALUE OF STEM-FOCUSED HIGH SCHOOL INTERNSHIPS

If I were asked to identify one experience that consistently changes the trajectory of a student's career aspirations, internships would be near the top of the list. Over the years, I have watched students begin internships uncertain of their future and complete them with confidence, professional connections, and a clearer understanding of their goals. Classroom instruction provides knowledge. Internships provide context.

Students gain exposure to workplace culture, project management, teamwork, communication, and problem-solving. They begin to understand how classroom concepts translate into real careers.

"Exposure creates opportunity. When students can see themselves in a profession, they are more likely to pursue it."

THE STEM BEHIND ADVANCED MANUFACTURING

Many students still associate manufacturing with repetitive assembly-line work. That perception no longer reflects reality.

Modern manufacturing facilities are among the most technologically advanced workplaces in our economy. During site visits with employers across Georgia, I have observed robotics systems, artificial intelligence applications, digital twins, predictive maintenance technologies, and highly automated production environments. The challenge is not convincing employers that these careers are valuable. The challenge is ensuring students understand the opportunities available to them.

PREPARING STUDENTS FOR AN AI-ENABLED WORKFORCE

No workforce trend receives more attention today than artificial intelligence. In workforce development programs across Georgia, AI is increasingly being used to personalize training pathways, identify skills gaps, improve workforce planning, and support learning outcomes. Employers are exploring how AI can improve efficiency and automate repetitive tasks while allowing employees to focus on higher-value work.

Yet there is another side of the conversation that deserves attention. While AI creates opportunities, it also raises important questions about ethics, privacy, bias, and workforce displacement. Students must learn not only how to use AI but how to evaluate it critically.

Research from the World Economic Forum and PwC suggest that by 2030, AI will influence the majority of occupations. That does not mean AI will replace most workers. Rather, most workers will likely use AI as a tool that helps them perform their jobs more effectively.

HELPING STUDENTS DEVELOP EMOTIONAL REGULATION

As educators and workforce leaders, we often focus on academic performance and technical skills. However, emotional regulation may be one of the most

important skills students develop. The ability to manage stress, recover from setbacks, and remain focused under pressure affects classroom performance, workplace success, and overall well-being.

BRAIN SCIENCE AND TEST PERFORMANCE

Many students have experienced the frustration of studying diligently for an exam only to struggle with recall during the test itself. Neuroscience helps explain why.

When stress levels become elevated, memory retrieval can become more difficult. Understanding this process helps students adopt healthier study habits and better stress-management techniques.

A NEW DEFINITION OF STUDENT SUCCESS

The students who thrive in the decade ahead will not necessarily be those who memorize the most information. They will be the individuals who can think critically, collaborate effectively, adapt to change, leverage technology responsibly, and continue learning throughout their lives.

Career exploration. STEM education. Internships. Emotional wellness. Artificial intelligence. These are not separate conversations. Together, they form the foundation of workforce readiness. As Georgia continues to strengthen its economy and attract new industries, our responsibility extends beyond preparing students for graduation. We must prepare them for opportunity.

That future is already here.

AUTHOR BIO

Dr. Loretta Daniels is Executive Director of TAG Education Collaborative. She works with educators, employers, workforce development leaders, and policymakers to expand career pathways, strengthen workforce readiness, and prepare learners for success in an AI-enabled economy.

Georgia Tech Enterprise Innovation Institute

GEORGIA AIM
Artificial Intelligence in Manufacturing

Leading Georgia's AI Future: Donna Ennis on the Promise of Georgia AIM

By Dr. Loretta Daniels

Donna M. Ennis, Associate Vice President of Tech Enterprise Innovation Institute (EI^2)

Donna M. Ennis is associate vice president for community-based engagement at the Georgia Tech Enterprise Innovation Institute (EI^2), where she oversees programs connecting communities to innovation and economic development, including Georgia Artificial Intelligence in Manufacturing (Georgia AIM), which she co-directs. Georgia AIM leverages a statewide network of over 100 partners for the development and deployment of talent and innovation in AI for all manufacturing sectors.

Through innovation, collaboration, education, and participation, Georgia AIM is providing the tools and knowledge to empower all communities to fully participate in a robust AI manufacturing workforce.

1. Q. ***For readers who may be unfamiliar with Georgia AIM, how would you describe the initiative's mission and its importance to Georgia's economic future?***

Georgia AIM's mission is twofold. First, to help manufacturers become more competitive through the adoption of AI, innovation, and smart technologies. And second, to build a future-ready workforce from "K to gray" that can participate in manufacturing and other industries.

These are two critical components to strengthening Georgia's future economic stability and competitive standing in the U.S. and the world. They provide a strong foundation that allows all Georgians to successfully participate in the AI economy.

2. Q. ***Georgia AIM brings together industry, education, government, and community partners across the state. What makes this collaborative approach unique, and why is it critical to advancing AI in manufacturing?***

While collaborations across different partners aren't unique, what makes Georgia AIM different is its statewide scale that focuses on the community level; it's both broad and deep in how it works. However, Georgia AIM's collaboration begins in the communities it serves. This means we are responding to communities' needs in different ways, through programs that already have the support of residents. It also creates collaboration through the expertise of our partners.

For example, the Georgia Cyber Innovation and Training Center is part of a larger cybersecurity ecosystem in the Augusta area, but the services its students provide help small businesses across the state. And our partners at Georgia Tech are connecting with communities across the state to provide interns, fellowships, technical expertise, and expand STEM programming. This collaborative approach allows for cross-pollination and empowers communities to ask for what they want and need.

3. Q. ***One of Georgia AIM's goals is to ensure that all Georgians can participate in the AI-powered economy. How is the initiative creating opportunities for students, adult learners, rural communities, and underserved populations?***

Because Georgia AIM has so many partners, we reach populations in a variety of ways. The goal is to meet people where they are, and so this means different things in different places. Our Southwest Georgia project is a great example of this. More K-12 students have access to STEM programs through the expansion of Georgia

Tech's K-12 InVenture Prize in the region.

High school students designed and built Pinewood Derby-style race cars through an engineering program funded by the Southwest Georgia Regional Commission, and now three high schools have CNC machines.

Southern Regional Technical College has equipped and expanded two labs to train students on advanced manufacturing, and more manufacturers are connecting with the technical college's resources to learn about AI technologies in manufacturing. Plus, Georgia AIM funded a series of Small Business Development Center classes in the region for entrepreneurs to expand their ideas — and all of this is in one region!

Elsewhere, Georgia AIM funded 13 interns through a partnership with the University of North Georgia and continues to provide AI in manufacturing fellowships through the Partnership for Innovation (PIN). And where there might be a gap in a region, our Georgia AIM Mobile Studio can pull up and offer hands-on demonstrations to get residents thinking about how they can incorporate new technologies in their work.

4. Q. ***Workforce development is a major component of Georgia AIM. What skills and career pathways do you believe will be most important as artificial intelligence continues to transform manufacturing?***

While technical skills will continue to be critical requirements, we have discovered that non-technical skills, or "soft skills" are just as essential. More and more, employers are discovering their talent pools are lacking communication, organization/project management, social, judgement, decision-making and leadership skills. These qualities are often learned over time and cannot be readily acquired through a training program.

Technical pathways in cyber security, robotics, and automation continue to top the list. However, manufacturing companies need all types of professionals including those in human resources, marketing, accounting, and customer service. However, career pathways are always evolving. One thing we've noticed through Georgia AIM is the development of new job titles as new skills are needed.

This is something we tell individuals - look for the skills you want to use, not necessarily the job titles. One company's robotics technician might be another one's mechanical specialist. And currently, there is no standardization

or one-size-fits-all job description for the new jobs emerging in advanced manufacturing. What's different now is that individuals with AI implementation skills are valuable to manufacturing at all levels.

5. Q. ***Can you share a success story or example that demonstrates how Georgia AIM has helped a manufacturer, student, entrepreneur, or community better prepare for the future?***

The individual stories are so powerful, and it's difficult to choose just one. For example, the Georgia VECTR Center in Warner Robins now trains students to program and maintain robots through its AI-Enhanced Robotics Manufacturing program. Veterans can take classes and receive a certificate as they transition to civilian life. One recent graduate spent his military career working in healthcare but was eager for a change.

After completing the robotics program, he now travels to manufacturers across the Southeast to perform maintenance on robots, and he loves his job. He never would have found this pathway if it wasn't for this program. At the Georgia Cyber Center, students at Augusta University learn to work with small companies to help them shore up their data security; this real-world experience changes their perspective on working in cybersecurity and fuels their passion to help businesses.

In Middle Georgia, we helped expand competitive robotics teams and give more K-12 students the opportunity to learn from the valuable FIRST Robotics program. This means more students are learning soft skills such as problem-solving and teamwork, along with STEM skills. One team member in Warner Robins leads outreach and promotion for her team, even though just two years ago she was so shy she barely spoke to her classmates. These programs are developing leaders, not just great students.

6. Q. ***Many people are concerned that AI will replace jobs. How do you address those concerns, and what opportunities do you see AI creating for Georgia's workforce?***

First of all, AI has been around since the 1950s and is used in most technology today. While it is viewed as this separate "thing," it is not. It is embedded in many tools and devices that we use today. It is true that a paradigm shift is happening as a result of the exponential growth of AI as a technology and that job roles are shifting. However, while some jobs may be going away, new careers are being launched. For example, who knew five years ago that prompt engineer/integration specialists or AI ethics specialists would be viable careers today? My position is that it's

not that AI will be taking jobs, it is people using AI will replace those who don't.

7. Q. ***Georgia AIM has invested in initiatives such as Mobile Studios, innovation incubators, and regional partnerships. Which of these efforts do you believe will have the most lasting impact, and why?***

These were intentionally strategic investments because they were led by community need. For example, Wiregrass Technical College in South Georgia has a strong connection between its innovation incubator and the area's K-12 schools, and both are strong partners with the Georgia FLEX program.

This means rural students now have the resources to go from idea to prototype, with professional guidance along the way. The mobile studios at Fort Valley State University are paired with the Fab Lab there, and it's a dynamic program that is meeting a critical need in the region for innovation and education. The mobile labs can connect people to technology, especially in rural areas where transportation can be a barrier. In fact, the larger goal of creating all the items you listed was that they would be sustainable. By developing assets that communities recognized as critical needs, we were helping them realize goals over shorter timelines.

8. Q. ***Looking ahead five years, what does success look like for Georgia AIM, and how do you envision Georgia's leadership role in AI-enabled manufacturing evolving nationally and globally?***

Looking ahead, we will see Georgia AIM's success through sustained collaboration, an adaptable workforce, and scalable innovation. Our coalition partner model has fundamentally changed the dynamic of partnerships across the state, and I hope we see partners continuing to work together. We will be recognized for a model that is locally grounded yet nationally impactful, serving as a replicable framework for other regions.

When it comes to AI in manufacturing, Georgia now has about 200,000 unfilled jobs in manufacturing. I hope to see an increase in jobs filled across the state, along with a rise in individuals of all ages entering and advancing within the manufacturing workforce. But for me, it always comes down to the people, and Georgia AIM will be defined by a steady pipeline of success stories, of people and communities, whose life and career trajectories have improved because of a Georgia AIM-supported program.

Georgia is in a unique position when it comes to AI in manufacturing. We're a logistics hub, a growing tech power-

house, and we have a diverse workforce that includes early career professionals, seasoned workplace veterans, and urban and rural populations. Georgia AIM is contributing to that, and as our core initiatives such as mobile studios, learning opportunities and workforce partners continue to expand in scale and impact, Georgia is well positioned to be a national AI leader in both research and practice.

Given the impact of Georgia AIM, I hope to see our partners positioned nationally and globally as thought leaders in AI-enabled manufacturing actively shaping the field through contributions to policy, research, workforce development strategies, emerging standards, and best practices. This will enable Georgia to be recognized as a leader in aligning innovation, workforce development, and industry needs to drive the future of AI-powered manufacturing.

Forging the New Manufacturing Workforce with Game-Based Learning

By Samantha R. Trzinski, Cory Neugebauer, Michael Groeber, Josh Groves, and Jonah Sagers

As the United States faces a potential shortage of millions of manufacturing jobs filled, new workforce development initiatives that encourage people to pursue relevant career pathways are essential. To address this deficit of skilled workers in the metal deformation industry, the U.S. National Science Foundation HAMMER Engineering Research Center (NSF HAMMER-ERC) has developed a training platform called the Digital Agility Forge, which is intended to train users on how to use a new advanced manufacturing system.

This platform features video game elements that have been integrated into a physics-based simulation of NSF HAMMER-ERC's Agility Forge—a computer numerical controlled hot forge. Users select a target shape to produce and then heat and deform raw material to create their intended finished product. With each hit, the user's accuracy rating increases or decreases accordingly, allowing the user to receive real-time feedback on what they have created and how closely it aligns with their intended shape. The controls and responses mirror those of the real-world Agility Forge system, making the Digital Agility Forge an effective training platform.

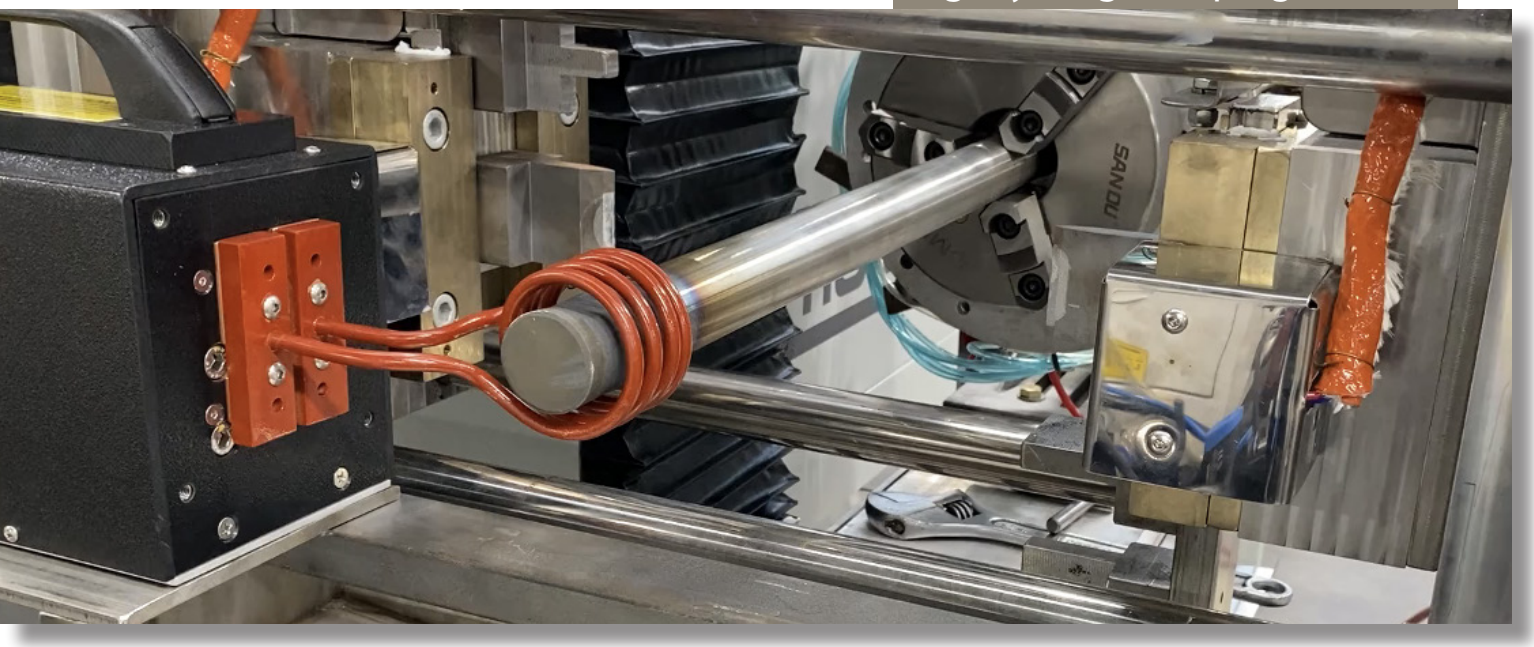
Gameplay of the Digital Agility Forge

The Digital Agility Forge is an example of a game-based learning platform. Game-based learning is a pedagogical approach in which games are used as tools to enhance and facilitate student learning and content engagement.[i] The mechanics of these games can be transferred to game-free contexts, like primary and secondary education, adult and higher education, and the workplace.[ii]

Proponents of game-based learning often highlight the motivational function of such games and their ability to engage players, which can make the educational or training process more enjoyable. The games can also be shaped to individual users' needs and can offer a space for users to make mistakes or

fail without risk of injury or equipment damage.[iii] When learning how to use new technologies, these elements are especially useful. The process of learning controls and procedures for advanced machinery can be tedious or overwhelming to users, especially those with little to no prior experience.

Agility Forge shaping a metal



Additionally, new technology can be intimidating to use because mistakes or failures can lead to damage requiring expensive repairs, wasted materials, or injuries. Game-based learning environments give users the opportunities to make mistakes and learn from them, without catastrophic results.

In February 2026, NSF HAMMER-ERC collaborated with the Metro Early College High School, located in Columbus, Ohio, to develop a six-week course centered around the Digital Agility Forge and advanced manufacturing. Twenty-two students from the Metro Early College High School registered this elective course titled "Level-Up Your Future: Game-Based Learning and Manufacturing."

These students were predominantly sophomores and juniors at Metro, a STEM school in the Central Ohio region. When asked why they registered for the course, many students cited their interest in video games and a desire to learn more about "game-based learning." Few students had previous experience or familiarity with manufacturing or metalworking. The promise of playing a video game—and even testing out a new game never before played—excited the students and piqued their interest.

Because students did not have prior experience with manufacturing, the first three sessions of the course focused on building their foundational knowledge. During the first meeting, students were taught about the metal forming industry and about the rise of Industry 4.0 and its emphasis on robotics, automation, and artificial intelligence.

Students were then informed about the HAMMER Engineering Research Center and the new technologies it is developing for the metal forming industry, specifically the Agility Forge—a first-of-its-kind CNC forging machine. "Worker readiness is one of the major challenges with making a new system like the Agility Forge become the new norm in factories," says Dr. Samantha Trzinski, Director of Education Outreach and Workforce Development for HAMMER. "New technologies require workers with new skillsets. Game-based learning offers a potential solution to this challenge."

During the second session of the course, students were taught more about the use of game-based learning, especially in the manufacturing industry. Dr. Erik Verlage, a Research Scientist for the Center for Design and Manufacturing Excellence at The Ohio State University, walked through examples of game-based learning that he had designed. His game DataBytes Inc., for instance, teaches students about technological advancement in data centers and the importance of making investments in new equipment.

One of the key points that Verlage emphasized to students is that game-based learning is more than merely adding game elements to an educational assignment. "We aren't making chocolate-covered broccoli!" he told the students. Game-based learning is about making learning the enjoyable part—it should not be games as a reward for getting the correct answer.

The third session of the course focused on building student understanding of smart manufacturing. This meeting revisited many of the concepts that were introduced during the initial session, including the need for the manufacturing and metal forming industries to evolve by integrating new technologies. Students were also prepared to use the Digital Agility Forge—the game was downloaded onto their laptops, and they were provided with some information about the game's production.

After this session, students were then given access to the Digital Agility Forge and walked through how to play it. On average, students played the game for 3.7 hours outside of the course. The course concluded with a full-day field trip for the students to The Ohio State University.

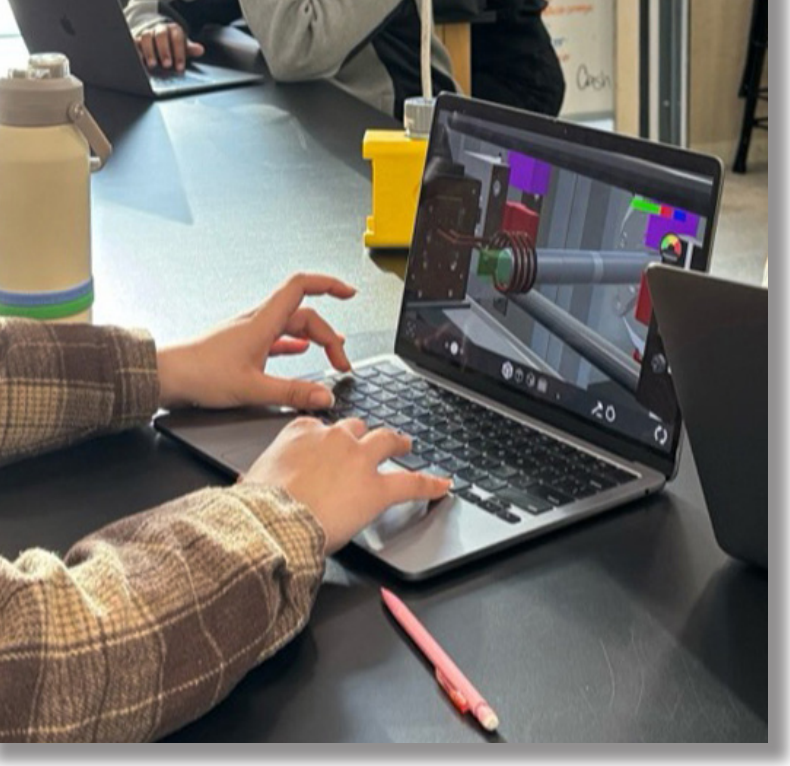
Professor Michael Groeber of The Ohio State University teaching students at the Metro Early College High School about the Digital Agility Forge.

During this trip, the students received an updated version of the Digital Agility Forge to continue using, and they had the opportunity to see the real Agility Forge in person. When surveyed about their experience in the Level-Up Your Future course, students largely highlighted how they learned more about the advanced technologies in the manufacturing industry.

The prevalence of robotics and automation had come as a surprise to many of the students, and the course had changed their perceptions of what a manufacturing career could be. 79% of students reported that the course improved their understanding of manufacturing, and 86% reported that it expanded their knowledge of manufacturing career pathways.

Additionally, the students also noted that they appreciated being given the opportunity to contribute to NSF HAMMER-ERC's research. Their testing of the Digital Agility Forge provided the HAMMER research team with new pools of data to aid the game's machine learning and uncovered bugs in the code that needed to be resolved before launching the game more widely.

The launch of the Digital Agility Forge at the Metro Early College High School marked a pivotal point in the game's development and demonstrated its potential as a workforce development



tool. As new technologies for the manufacturing industry, such as the Agility Forge, are developed, it is imperative that suitable training platforms are developed to make upskilling and outreach accessible to the current and future workforce.

Game-based learning offers an effective avenue through which such training can be delivered—thereby making the learning both engaging and rewarding for users of all ages.

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• Prof. Michael Groeber is the Director of Manufacturing at the Institute for Materials and Manufacturing Research, Faculty Director of the Artificially Intelligent Manufacturing Systems (AIMS) Lab, Director of Research for the Minority Leaders Research Collaboration Program, and an Associate Professor in both the Integrated Systems Engineering and Mechanical and Aerospace Engineering departments at The Ohio State University.

• Josh Groves is a Senior Research Engineer at The Ohio State University's Artificially Intelligent Manufacturing Systems (AIMS) Lab and Simulation Innovation and Modeling (SIM) Center, and he is pursuing his Ph.D. in Integrated Systems Engineering.

• Jonah Sagers is an undergraduate in Computer Science at The Ohio State University.

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	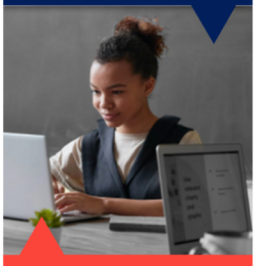			
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The STEM of Soccer *(Futbol)*

Soccer is a STEM sport, requiring the constant use of science (the systematic accumulation of knowledge), technology (the practical application of science), the engineering method (decision making and problem solving), and mathematics (the science of numbers, their operations, interrelations, combinations, generalizations, and abstractions).

Once again we see the human brain is already wired for the physics of soccer and other sports, therefore we don't actually have to "learn" everything. Aside from rules and guidelines of the sport, participation is a ballet of "hard-wired" science, technology, engineering and math.....lots of math.

Let's simplify and clarify our participation in soccer from the STEM perspective. This will educate you on the nuances of what your mind and body are doing naturally and intellectually.

The Science of Soccer

The systematic accumulation of knowledge (science) in soccer includes:

● Learning the rules and positions of the game.

● Learning and understanding the formations the team will use in the course of any match.

● Learning and maintaining updated knowledge about your personal physical fitness and endurance abilities. This includes dietary priorities, physical training response, rest requirements, and importantly, mental health and attitude status. Mood and emotions can vary widely from day to day and directly impact performance.

- how long can I run "***all out***"?
- how much and what should I eat prior to the match?
- what is my pre-match routine?
- what physical and mental prep needs to be done?

● Learning and maintaining information about your team mates, their fitness, abilities, tendencies, preferences and communications styles.

●As well as knowing your teammates, you'll need to know all there is about each player on each team you play. Their fitness, abilities, tendencies and so on directly affect your competitiveness against them.

●Understanding the condition of the turf at each stadium on any given day, as it will directly affect your footing and play.

There is certainly much more to know and learn, but this is a general representation to consider.

The Technology of Soccer

As this is the practical application of the science we've discussed, applying all we've learning is critical to personal performance and team outcomes. Playing your best does not guarantee wins, but lack of preparedness and application certainly encourages losses.

Other tech considerations include and knowledge of your interactions with the

the soccer ball. Though all regulation balls are standardized, how you kick the ball on that days turf (moisture, temperature) is a practiced application learned from months and years of experience.

Your cleats for this match will probably be chosen specifically for turf conditions and your personal preference based on those months of experience.

The Engineering of Soccer

As a decision making and problem solving process, throughout the match we are constantly choosing from a variety of choices as to where to run, kick the ball, how hard to kick it, how high, to whom and what are all of the possible outcomes of those choices....then we choose in an instant. Sometimes it's a good choice, other times it's not.

These instantaneous choices are an amazing function of our brains, but also a "learned" skill for many. Whether you are a natural or a student of soccer, you will need the engineering method.

Reflecting back on the "science" we've accumulated about players and ourselves, our play choices are rooted in experience and a formation plan. The primary **problem** to be solved is simple:

"How to get the ball past defenders and into the goal. And on the opposite side, how to keep their ball out of our goal"

The catch is, there will be a hundred smaller problems to solve from start to finish, each requiring decisions by every player on the field. Every moment of the game, everyone on the field is trying to solve their problem of how to position themselves in relation to their opposition player, formation and opportunities.

Decisions -

- Where should I be at this moment?
- Where do I need to be a 15 seconds from now?
- What might my opponent do right now or in response to my play?
- Should I pass or push?
- Is the formation working?
- Should I speed up, juke, get physical?
- **DECIDE NOW**
- Then do it again, and again, and again.

One decision every 2–4 seconds.....
2,000 per match.

The Math of Soccer

Geometry and Physics dominate this sport and connect closely to your decision making. Although physics is not math, mathematics is the fundamental language of physics, serving as the bridge between abstract concepts and the natural world. It provides the exact vocabulary, grammar, and syntax needed to formulate physical laws, model complex systems, and make verifiable predictions about reality - in this case, the behavior of the soccer ball.

Physics - the study of the physical plane of matter, motion, force, and energy.

Newton's Laws of Physics

Law 1

The first law of motion is called the Law of Inertia. It states that "any object at rest, will tend to stay at rest, and any object in motion, will tend to stay in motion unless acted on by an unbalanced force."

In soccer however, this unbalanced force is usually the soccer player's foot. He or she will use muscles in the body to create a force to move the leg forward and kick the ball. Once kicked, it will keep moving without stopping. The reasons the ball will stop on its own is because of friction with air resistance, friction contact with the ground and Earth's gravitational pull. A player will have to intercept the flight or roll of the ball to break the first law.

Law 2

"The change in velocity (acceleration) with which an object moves is directly proportional to the magnitude of the force applied to the object and inversely proportional to the mass of the object."

This can be explained by the equation F=ma. The acceleration of the ball (a) is determined by the force applied (F) divided by the mass of the object that is being moved (m). This simply means that if the ball has a lot of mass, it will require more force to accelerate. If the ball has little mass, it will require little force. Since regulation balls are the same, this calculation remains the same from match to match.

Law 3

Newton's final law of motion states that "..for every action, there is an equal and opposite reaction."

This literally means that when you kick the soccer ball, it will resist you just as hard. Since your leg has more mass, applied energy and acceleration, the ball has no choice to move in the opposite direction.

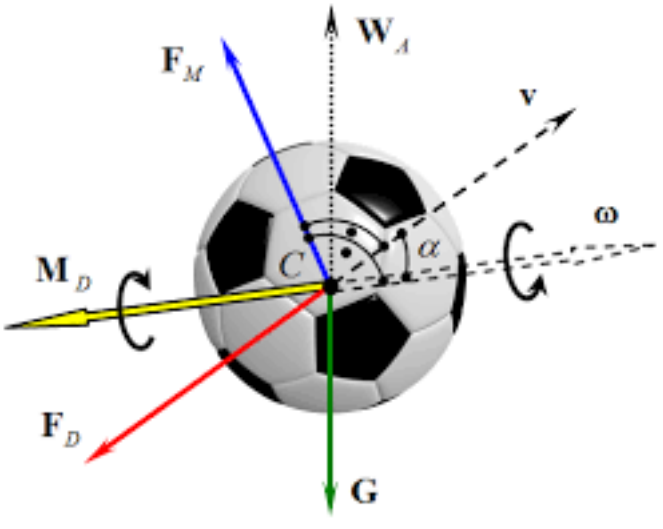
Geometry -a branch of mathematics that deals with the measurement, properties, and relationships of points, lines, angles, surfaces, and solids.

The mere successful interception of the ball by another player is an amazing feat of mental math and engineering, instantly calculating the ball speed, direction and what will most likely be the outcome of its flight. Using your eye and feet coordination, you must estimate the point of interception, and get there.....a geometric angle. The speed and direction of the ball are evaluated, the energy forced on the ball is estimated, the running speed and direction have to be adjusted, and then executed. Do this again, and again and again.

This isn't a law, but we need to mention momentum. When a player kicks a ball, they transfer their momentum to the ball. Momentum is the velocity of an object times its mass. When players pass the ball to each other, they may use their feet to slow (control) the momentum of the ball by moving with the ball and resisting it slowly. This way, they can have more control over the ball. This is decision making and often problem solving as kicking in a specific direction, at a precise speed, at an exact moment, is at the heart of soccer. The principals of geometry, basic multiplication, trigonometry, calculus .....did you have any idea? You are so much smarter than you know and much of it is hard-wired in your brain.

Say it...."I enjoy using math".

We love our sports, both as participants and observers. Understanding the STEM of the sport adds interest, appreciation and awe at the ability of the human mind and body when finely tuned by devoted athletes. In spite of momentary resistance to learning a subject we don't immediately enjoy, we often embrace that subject in pursuit of another passion, such as sport. In order to become the athlete we want to be, no obstacle or necessary "subject" will stand in our way.



Another Career A.I. Will Never Do.....

The STEM Of Carpentry

By Wayne Carley

It's estimated that about 1.36 million new housing units were started in 2025. This does not include the over 10 million remodeling projects. AI didn't build any of them….skilled labor did, with an average build time of 6-9 months.

Another group of career fields that AI will never do surrounds the hands-on construction fields – in particular, the carpentry of home building. Can a robot hammer a nail? Sure...but it's not practical, affordable or fast.

Careers in carpentry play a central role in home building, combining skilled craftsmanship, problem-solving, and physical work to create the structures people live in every day. Carpenters are responsible for constructing, installing, and repairing the wooden frameworks and finishing elements that form the bones and character of residential and commercial structures.

Housing demands will continue and skilled trades experience workers are in short supply as you may guess. This set of skills is usually stable employment with a variety of associated career paths that offer diversity of applications, wages and entrepreneurial possibilities. This is a skill that can be applied worldwide, so geographic areas of interest are very possible.

Carpentry in home building begins with rough carpentry, the stage focused on structural components, such as floors, wall studs, roof joists, joints, fasteners and in general, the bones of the structure, according to the blueprints. All of these puzzle pieces have to be measured, cut and fit into place with precision, by hand, which brings us to the **SCIENCE** of carpentry.

SCIENCE, defined as the systematic accumulation of knowledge, is applicable to carpentry as there is a wide variety of tools, techniques, interpretive skills, regulations and safety precautions to be considered. ***What does a carpenter need to know?*** Let's begin with the tools of the trade needed to become proficient.

Hand tools (power and manual)

Hammer (claw, framing, finish)
Pneumatic systems (air powered)
Levels (manual and laser), Squares
Chisels
Hand saw, power saw, table saw
Screwdrivers (flathead, Phillips)
Power drills
Impact driver
Nail gun (finish, brad, framing)
Staple gun
Router
Power planer
Biscuit joiner
Pocket-hole jig
Oscillating multi-tool

Fasteners

Common nails
Box nails
Finish nails
Brad nails
Casing nails
Duplex (double-headed) nails
Concrete/masonry nails
Wood screws
Deck screws
Drywall screws
Structural screws
Cabinet screws
Lag screws (lag bolts)
Pocket-hole screws
Self-drilling screws
Carriage bolts
Hex bolts
Machine bolts
Threaded rods
Anchor bolts
Narrow crown staples
Medium crown staples
Wide crown staples
Upholstery staples
Expansion anchors
Sleeve anchors
Wedge anchors
Toggle bolts
Molly bolts
Plastic wall anchors

Maintenance, care and storage of these tools ensures their reliability - tools cost money.

Building Science & Materials

Wood types and grades
Engineered lumber and composites
Moisture control and weatherproofing
Insulation basics
Structural load concepts (especially for framing)
Blueprint interpretation / application
Floor systems – joists, subflooring, rim boards
Wall framing – studs, plates, headers, fire blocking
Roof framing – rafters, trusses, ridge boards
Stair framing and rough openings
Understanding load paths and structural intent
Sheathing (OSB, plywood)
Housewrap and flashing techniques
Window and door rough installation
Decks, porches, and exterior stairs
Basic siding systems (fiber cement, vinyl, wood)
Hanging interior doors and installing windows
Baseboards, crown molding, casing, and trim
Cabinet installation and built-ins
Flooring prep (subfloor flattening, transitions)
Closet systems and shelving

This all takes time to learn and become proficient at. Apprenticeships, Internships, on the job training and trade schools all contribute to the process of accumulating knowledge.

TECHNOLOGY of carpentry is defined as the practical application of the science learned. Innovative tech in carpentry includes tool tech as well as software applications.

Digital Planning & Design

CAD (Computer-Aided Design) & BIM software for reading and coordinating digital blueprints are a necessary skill as 3D modeling to visualize framing, cabinetry, and interior finishes provide for a more efficient and accurate build.

Advanced Power Tools

Brushless cordless tools (saws, drills, nailers) with longer battery life.
Smart tools that track usage and maintenance.
Precision saws with digital angle and depth settings.
Dust-collection systems integrated with saws and sanders for cleaner job sites and faster cleanup.

Sustainability & Energy Efficiency

Green building materials
Advanced insulation systems
Air-sealing technologies
Energy-code compliance software
Solar integration
Recycling of unused materials

The **ENGINEERING** of carpentry

Engineering is about problem solving and decision making. The process of building a structure seldom goes according to plan and problems have to be solved daily....requiring the best decision. Diagnosing blueprint discrepancies, materials suitability and human errors on site require a practical, code-compliant solution that keeps the project safe, accurate, and on schedule. There may be a foreman on site, but the carpenter discovers the problem and solves it or brings it to the attention of another decision maker. Either way, you have to make it right.

- Evaluate material quality quickly
- Decide whether to reject, modify, or re-purpose materials
- Plan cuts to minimize waste
- Substitute approved materials when necessary
- Safety and code considerations
- Modify work methods to improve safety
- Logical thinking decisions
- Attention to detail choices
- Adaptability in decisions
- Experience-based judgment when addressing a problem

What are some of the problems to be solved by the carpenter?

- the material doesn't meet specs
- the blueprint is in error
- lumber dimensions are incorrect
- shortage of desired fasteners
- chosen tool is unavailable
- safety is in question
- critical information is missing
- another persons error changes your task

Though the problems may seem simple or insignificant, decisions must be made and the consequences of those decisions directly affect the successful construction of the structure, and your job.

Let's not forget the importance of ***collaboration.*** We're not building alone as many carpenters will be on site as well as the effective communication with other contractors such as electricians, heating and air, plumbers, concrete workers, landscaping, and the ever popular inspectors looking over your shoulder. Building codes, safety and site rules must be considered and followed. Breaking these would be a "bad decision".

The **MATH** of carpentry

Carpentry relies on practical, everyday math to ensure blueprint specs have been met inch by inch. The average U.S. home has between 12,000-16,000 board feet of lumber, cut into thousands of pieces, each having been measured by hand to fit as required. The use of basic arithmetic and geometry are vital when determining angles, lengths, widths and how those calculations fit together.

- Addition and subtraction
- Division - spacing and layout

Example: 96 inches ÷ 16 inches = 6 studs

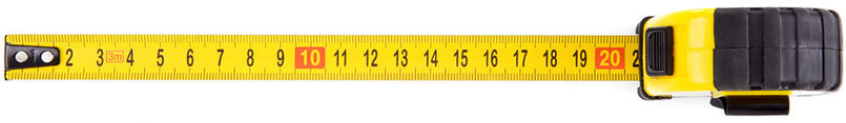
- Simple fractions (1/4", 1/2", 1/8")
- Degrees (90°, 45°, etc.)
- Rise, run, and slope
- Roof pitch (e.g., 6/12, 8/12)
- Stair layout (rise/run calculations)
- Pythagorean Theorem

Used to square walls and foundations:

$$a^2+b^2=c^2$$

#1 Rule of carpentry

"Measure twice - cut once"



Guiding Students to Emotion Regulation Using the 3 R's

By Tammy Schamuhn
Registered Psychologist & Co-Founder of
The Institute of Child Psychology

The modern classroom is a busy, emotionally complex place. Teachers juggle academic expectations, diverse learner needs, and rising rates of student anxiety, dysregulation, and trauma-related behaviors. In the middle of this complexity, many educators find themselves asking the same question: How do I help students calm down, connect, and engage in learning—especially when they seem overwhelmed?

Neuroscientist and child psychiatrist Dr. Bruce D. Perry, known for his work in trauma and brain development, offers one of the most practical, compassionate, and scientifically grounded answers: the 3 R's of Emotional Regulation—

- Regulate
- Relate
- Reason

(Perry & Szalavitz, 2021).

This model is rooted in the way the human brain organizes itself and fits within a broader framework related to the "triune brain" and interpersonal neurobiology, including the work of Dr. Daniel Siegel on the upstairs and downstairs brain (Siegel & Bryson, 2012). This framework doesn't just change behavior management; it transforms the emotional climate of classrooms and strengthens student mental health.

The Three Floors of the Brain

Think of the brain as a three-level house. This simplified structure helps adults understand why traditional approaches such as talking, reasoning, lecturing, or disciplining, often fail during moments of distress.

The Lower Floor: The Brainstem

The brainstem is the body's command center for survival. It controls heart rate, breathing, muscle tension, and the fight-or-flight response. When a student is overwhelmed, frightened, overstimulated, hungry, tired, malnourished, or movement deprived, they slide into the bottom floor. In this state, the brain is not prioritizing cooperation or compliance; it is scanning for danger.

These cues of danger, what Dr. Stephen Porges calls cues of neuroception of safety (Porges, 2011) can come from inside the body or from the outside environment. A child might sense danger from a chaotic classroom (i.e., bright lights, loud voices) or from feelings of hunger that originate from not being provided an adequate breakfast at home.

A student functioning from this floor may appear angry, avoidant, explosive, restless, shut down, oppositional, or unable to sit still. What we often label as "misbehavior" is simply a nervous system saying, "I don't feel safe" (van der Kolk, 2014). Attempts to reason or discipline at this point usually escalate the situation, because they ask the child to use parts of the brain that are temporarily offline.

The Middle Floor: The Limbic System

This level of the brain governs emotions, relationships, attachment, and social connection, and it is profoundly sensitive to the school environment. The limbic system acts like a radar, constantly scanning for cues of belonging or rejection and connection or disconnection (Siegel, 2012).

At school, many factors can push a student into a limbic state. Social conflict, such as being excluded at recess, struggling with friendships, or misreading peer cues, can all make the limbic system go on high alert, signaling that the student's social world is unstable. A harsh tone from a teacher, a misunderstanding with a classmate, or even subtle experiences of embarrassment can activate the limbic brain, especially for sensitive or relationally anxious students (Jennings, 2018).

For students with trauma histories or attachment disruptions, limbic activation can be even more intense. Their nervous systems may misinterpret neutral cues (i.e., a teacher's redirection or

a peer's facial expression) as relational threats. They may fear disappointing others or becoming disconnected and spend much of the day in a state of emotional hyper-vigilance (Perry & Szalavitz, 2017). In these moments, even small stressors can feel enormous, and behaviors like shutting down, becoming tearful, withdrawing, or reacting strongly are signs that the student's limbic system is overwhelmed, not that they are choosing to be defiant or dramatic.

The Top Floor: The Cortex

The cortex is the part of the brain where academic learning happens. It controls reasoning, language, planning, impulse control, decision-making, executive functioning and emotion regulation (Diamond, 2013). This is the floor teachers hope to access during lessons, discussions, and problem-solving activities.

But the cortex is only available when the floors beneath it are stable. A child must feel connection and psychological safety before they are ready to learn.

Many academic struggles are actually symptoms of dysregulation on the lower floors. A student who cannot focus, organize materials, remember instructions, or stay on-task may not be lacking ability, they may be unable to access their thinking brain because their survival or emotional systems are activated. This is why students who seem "fine" one moment can suddenly shut down or become overwhelmed when challenged or corrected. If they slide down the stairwell into the limbic

system or the brainstem, then the cortex goes "offline" immediately.

School-based factors that disrupt the cortex include performance anxiety, timed tasks, fear of embarrassment, academic pressure, sensory overload, negative feedback, or unfamiliar challenges. Even well-intentioned requests such as "calm down," "use your words," or "think about your choices" require cortical functioning—a resource the student may not currently have.

The 3 R's: A Sequence for Helping Students Return to Regulation

Regulate–Relate–Reason sequence mirrors the natural order in which the brain becomes available. Too often, adults jump straight to reason via explaining, lecturing, negotiating, or asking a child to reflect. But the brain does not unlock the reasoning centers until it first feels physically and emotionally safe.

1. Regulate

Regulation must always come first. Before a student can access empathy or logic, the body must come out of its alarm state. Regulation happens through the body, not the mind. Rhythmic, sensory, and movement-based activities help calm the brainstem. This may look like a short walk in the hallway, deep breathing with a teacher, a moment in a quiet space, yoga movements, time outdoors in green space, slow rocking, stretching, tapping feet on the floor, eating a snack (especially something crunchy or chewy), or taking a drink of water.

Sometimes it is simply the steady, unwavering presence of a calm adult whose nervous system the child can "borrow" for stability and co-regulation (this is especially true for younger students with a far less developed cortex that governs regulation of feelings and the body).

Regulation also requires time, something schools often feel they don't have, yet paradoxically cannot function without. A dysregulated brain cannot be hurried back into learning on an adult's schedule. When a student is overwhelmed, their nervous system is operating far below the level where language and reasoning are accessible.

No amount of talking, lecturing, or consequence can override a brainstem in alarm. What can help is meeting the child where their body is. This means slowing our own pace, lowering our voice, reducing demands for the moment, and creating enough predictability and safety for the student's physiology to shift out of threat mode.

For some children, particularly those with trauma histories, it may take repeated cycles of regulation throughout the day. Each successful cycle strengthens their internal capacity to regulate, gradually building the neural pathways that support emotional stability. In this way, regulation is not simply a crisis intervention; it is an essential part of teaching the skills that make learning possible.

2. Relate

Once the child's body begins to settle, the limbic system becomes available. This is the time to connect. Relating involves attunement—the adult matching the child's tone, energy, and emotional state with warmth and empathy. A soft voice, gentle eye contact (if welcomed), a validating statement, or sitting together quietly can communicate safety in ways that logic cannot. The message students need in this phase is: "You're safe. I'm here with you. We will figure this out together."

It is of particular importance with our more difficult students that we take a vested and intentional interest in their world. These are often the children whose behaviors are the loudest, whose reactions are the biggest, and whose defenses are the thickest—not because they don't care, but because caring feels risky. When educators learn even small pieces of a child's inner world (i.e., a sport they play, a favorite show, a cherished pet, or the complex dynamics of their family) we gain access to the relational "bridge" that helps us connect with them in moments when their nervous systems are overwhelmed.

Knowing these details isn't trivial; it becomes a lifeline. When a child feels seen beyond their behavior, their limbic

system receives a powerful message of safety: You matter. You are more than this moment. I see who you are, not just what you're doing.

3. Reason

When a student feels both physically regulated and relationally connected, their cortex—the top floor—comes back online. Only now can they think clearly, reflect on what happened, solve problems, repair harm, or learn new strategies. In this stage, educators can discuss the situation, revisit expectations, practice coping skills, explore alternatives, and plan for next time. Reasoning becomes productive and meaningful because the nervous system is ready for it.

Why This Matters for Educators and Student Mental Health

Schools are increasingly filled with students who are overwhelmed. Where it is by the demands of social life, sensory overload, academic pressure, trauma histories, inconsistent routines, or the lingering effects of chronic stress . Many students spend much of their

day in the lower floors of their brain, oscillating between emotional reactivity and withdrawal. When educators misunderstand these states as willful misbehavior, they respond with interventions (lectures, consequences, reasoning) aimed at the cortex—interventions the brain is simply not accessible to receive.

However, when teachers respond to students based on the state of their nervous system, rather than the surface behavior, they support both mental health and learning. This approach strengthens the teacher–student relationship, reduces shame, and offers students experiences of safety that many desperately need. It also increases the likelihood that students will remain regulated enough to meaningfully access academics.

In a world where student mental health challenges are rising, this framework reminds us that every behavior tells a story about a student's nervous system. When we listen differently, we respond differently. And when we respond differently, students thrive.

Tammy Schamuhn
R.Psych, R.P.T-S, Co-Founder of The Institute of Child Psychology

Tammy is a Registered Psychologist, best-selling author, Registered Play Therapist Supervisor, and Co-Founder of the Institute of Child Psychology. With a background in education and over a decade of clinical experience supporting children and families, Tammy brings a deeply attachment-focused and neurobiologically informed lens to her work.

She is also the Founder of the Child-Centered Animal-Assisted Therapy Association and runs an animal-assisted therapy program at Hooves of Hope Ranch. Drawing on both professional expertise and her own lived experiences of childhood trauma, Tammy teaches with compassion, clarity, and a down-to-earth style that makes complex mental health concepts accessible to parents and professionals alike.

References -

Diamond, A. (2013). Executive functions. Annual Review of Psychology, 64, 135–168. https://doi.org/10.1146/annurev-psych-113011-143750

Jennings, P. A. (2018). The trauma-sensitive classroom: Building resilience with compassionate teaching. W. W. Norton & Company.

Perry, B. D., & Szalavitz, M. (2017). The boy who was raised as a dog: And other stories from a child psychiatrist's notebook (Rev. ed.). Basic Books.

Perry, B. D., & Szalavitz, M. (2021). What happened to you? Conversations on trauma, resilience, and healing. Flatiron Books.

Porges, S. W. (2011). The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation. W. W. Norton & Company.

Siegel, D. J. (2012). The developing mind: How relationships and the brain interact to shape who we are (2nd ed.). Guilford Press.

Siegel, D. J., & Bryson, T. P. (2012). The whole-brain child: 12 revolutionary strategies to nurture your child's developing mind. Delacorte Press.

Van der Kolk, B. A. (2014). The body keeps the score: Brain, mind, and body in the healing of trauma. Viking.

When Students "Know It" but Can't Show It:
The Brain Science of Test Performance

By Betsy Hill

Most educators and parents have heard a student say something like this after a test: "I swear I knew It when I walked into the room… I don't know what happened."

This experience is surprisingly common. Tests are designed to measure whether students have learned the material they were taught. Ideally, a test score reflects mastery of content and the ability to apply knowledge. In reality, however, tests often measure something else as well: how efficiently the brain can manage the cognitive demands of the testing situation itself. Understanding what happens in the brain during a test reveals why capable students sometimes struggle to demonstrate what they know—and what educators and families can do to help.

Tests Are Cognitive Stress Tests

When students sit down to take a test, their brains must coordinate multiple cognitive systems simultaneously. A typical test question may require a student to:

- Sustain attention
- Hold information in working memory
- Retrieve previously learned knowledge
- Interpret language or symbols
- Organize multi-step reasoning
- Monitor accuracy
- Manage time pressure
- Regulate stress and emotions

This combination of demands means that tests function as cognitive stress tests. Even when students understand the content, the additional cognitive load can interfere with performance.

Consider a simple math word problem: A school is planning a field trip. There are 128 students going, 68 girls and 60 boys. Each bus holds 36 students. The school has reserved three buses. Will three buses be enough? If not, how many more buses are needed?

To solve this problem, students must first decode the language, screen out the irrelevant number and identify the relevant numbers, remember the relevant numbers while performing calculations, and keep track of multiple steps. Each of these processes draws on the cognitive resources they bring to the task, often reduced by the impact of being anxious.

In fact, research suggests that 25–40% of students experience test anxiety, and about one in five students experiences anxiety at levels high enough to interfere with performance. But anxiety is only part of the story.

Working Memory Under Pressure

One of the most important cognitive systems involved in testing is working memory—the brain's ability to hold and manipulate information temporarily. Working memory allows students to keep track of numbers in a math problem, remember the beginning of a sentence while reading the end, or follow multi-step instructions.

But working memory has limited capacity. Under conditions of stress, that capacity is reduced even further. When students feel anxious during a test, the brain's threat-detection system—the amygdala—becomes more active. This triggers physiological responses associated with the "fight or flight" reaction. Because the body is redirecting its resources to help us run away from danger, the prefrontal cortex, which supports reasoning and working memory, becomes less efficient.

The result is a familiar experience: students feel as if their minds have gone blank. The knowledge is still stored in long-term memory, but the pathway to retrieve it has become temporarily blocked by stress and cognitive overload.

Processing Speed and Time Pressure

Another important factor in test performance is processing speed—the rate at which the brain can interpret information and respond. Most classroom tests are timed. Students must read questions, interpret them, plan solutions, and produce answers within a limited period.

Students with slower processing speed may fully understand the material yet struggle to finish a test on time. As time pressure increases, cognitive load accumulates. Fatigue sets in, accuracy declines, and students may rush through the final portion of the exam. It is important to emphasize that slow processing speed is not the same as low intelligence. Many highly capable students simply require more time to work through complex information.

Study Habits That Hurt Performance

Some of the most common study habits used by students are surprisingly ineffective when viewed through the lens of cognitive science. For example:

Cramming
Massed studying shortly before a test creates familiarity with material but does not strengthen long-term memory. It also increases stress and often disrupts sleep—both of which undermine performance.

Passive review
Rereading notes or textbooks may feel productive, but it relies on recognition rather than retrieval. Recognition is far less demanding than retrieving and thinking about information and does little to strengthen the connections in the brain where information is stored. Information that is coded so superficially, just won't stand up to the test.

Reviewing everything equally
Students frequently spend time reviewing material they already know rather than focusing on areas of uncertainty. These habits create the illusion of learning without strengthening the neural pathways required for reliable recall.

Strategies That Actually Help

Research on learning and memory suggests several strategies that improve both retention and test performance.

Retrieval Practice

One of the most effective learning techniques is retrieval practice—actively recalling information rather than simply reviewing it. Frequent low-stakes recall strengthens neural pathways, making information easier to retrieve later. Flash cards, practice quizzes, and explaining concepts aloud are all examples of retrieval practice.

Spaced Practice

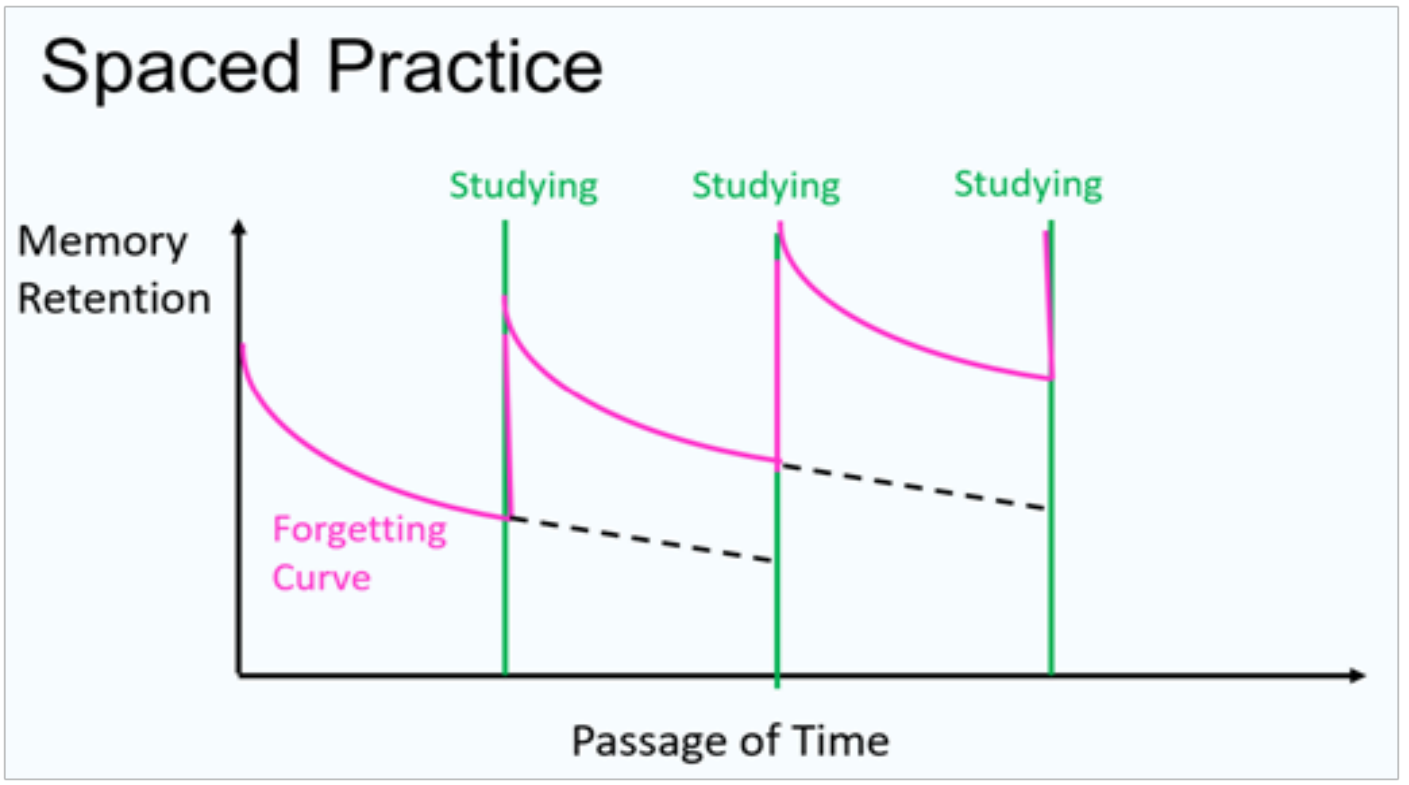
Learning is more durable when study sessions are spread over time. Known as spaced practice, this approach allows memory traces to strengthen through repeated reactivation. Each review slows the rate at which information is forgotten, gradually flattening the "forgetting curve" as depicted in the following image.

Practice Under Test Conditions

Simulating test conditions can also improve performance. Timed practice sessions help students develop a sense of pacing, build cognitive endurance, and reduce the novelty of the testing environment. When a situation feels familiar, it is less likely to trigger stress responses.

Sleep

Sleep plays a critical role in learning. During sleep, the brain consolidates memories, clears metabolic waste, and restores executive functions needed for reasoning and attention. Students who



sacrifice sleep to study often experience the opposite of the intended effect: weaker memory and poorer performance.

Managing Stress During Tests

Some degree of anxiety is normal and even beneficial. A small amount of stress increases alertness and motivation. However, when anxiety becomes excessive, it interferes with cognitive performance. Simple strategies can help regulate the stress response:

- Slow breathing to activate the parasympathetic nervous system
- Writing down worries before a test to reduce intrusive thoughts
- Brief relaxation routines that restore focus

These techniques do not eliminate anxiety, but they can prevent it from overwhelming the cognitive work of taking a test.

Strategic Test-Taking

Certain practical strategies can also reduce cognitive load during exams. Students benefit from:

- Writing key information in the margin so it does not have to be held in working memory
- Scanning the test first and planning how to allocate time
- Starting with easier or higher-value questions to build momentum
- Skipping difficult items temporarily and returning later if time allows
- Reading questions before passages in comprehension sections to guide attention

These strategies free cognitive resources for reasoning rather than memory management.

Looking Beyond Test Scores

Repeated patterns during testing can provide clues about underlying cognitive challenges. Students who consistently:

- run out of time
- blank under pressure
- make frequent "careless" mistakes
- or fatigue before finishing

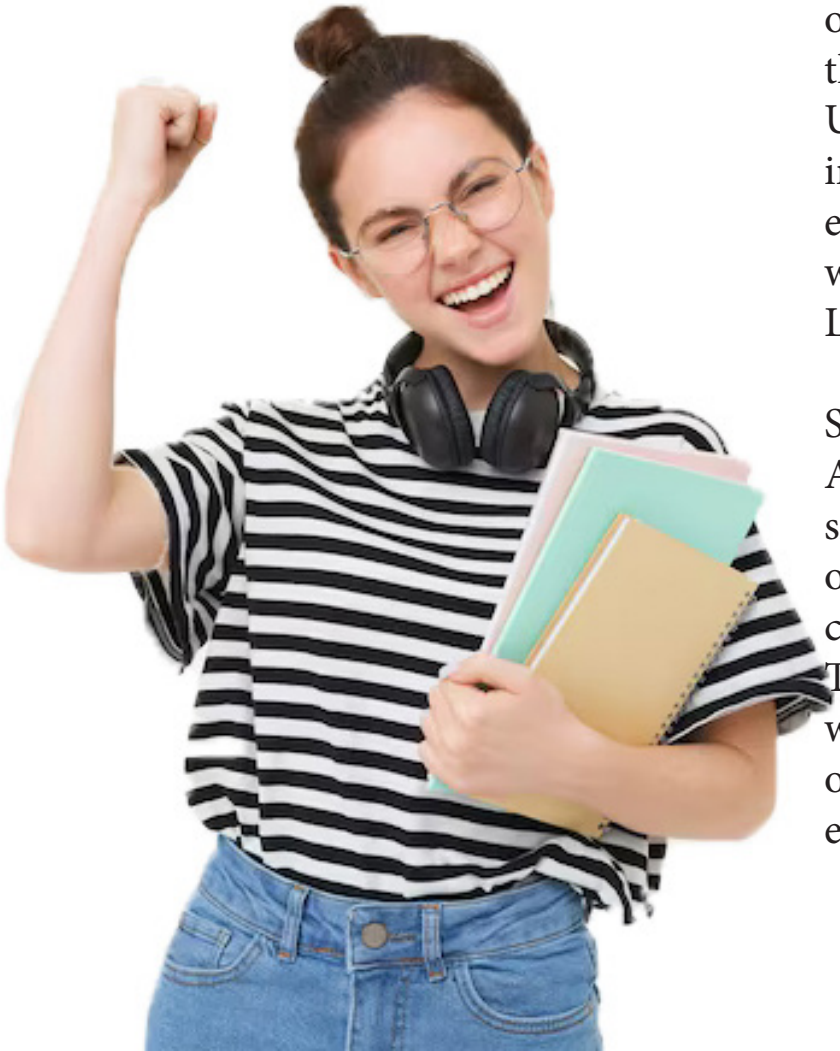
may not be struggling with motivation or effort. Instead, these patterns often reflect cognitive capacity constraints. Strengthening core cognitive skills—such as working memory, attention control, processing efficiency, and cognitive flexibility—can improve both learning and test performance.

A Broader Perspective on Testing

Tests will likely remain a central feature of education. But understanding the cognitive processes involved in test performance allows educators and

parents to interpret results more accurately. A low test score does not always indicate that a student failed to learn the material. Sometimes it reflects the brain's difficulty managing the complex cognitive demands of the testing situation.

When we recognize the role of cognitive skills in learning, we can move beyond simply preparing students for tests and instead focus on building the mental capacities that support learning itself. And when those capacities grow, students are better able not only to succeed on tests—but to become confident, capable learners.



Betsy Hill is President of BrainWare Learning Company, a company that builds learning capacity through the practical application of neuroscience.

She is an experienced educator and has studied the connection between neuroscience and education with Dr. Patricia Wolfe (author of Brain Matters) and other experts. She is a former chair of the board of trustees at Chicago State University and teaches strategic thinking in the MBA program at Lake Forest Graduate School of Management where she received a Contribution to Learning Excellence Award.

She received a Nepris Trailblazer Award for sharing her knowledge, skills and passion for the neuroscience of learning in classrooms around the country. She holds a Master of Arts in Teaching and an MBA from Northwestern University. Betsy is co-author of the book, Your Child Learns Differently, Now What?

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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.

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Sign up for a course today!

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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?

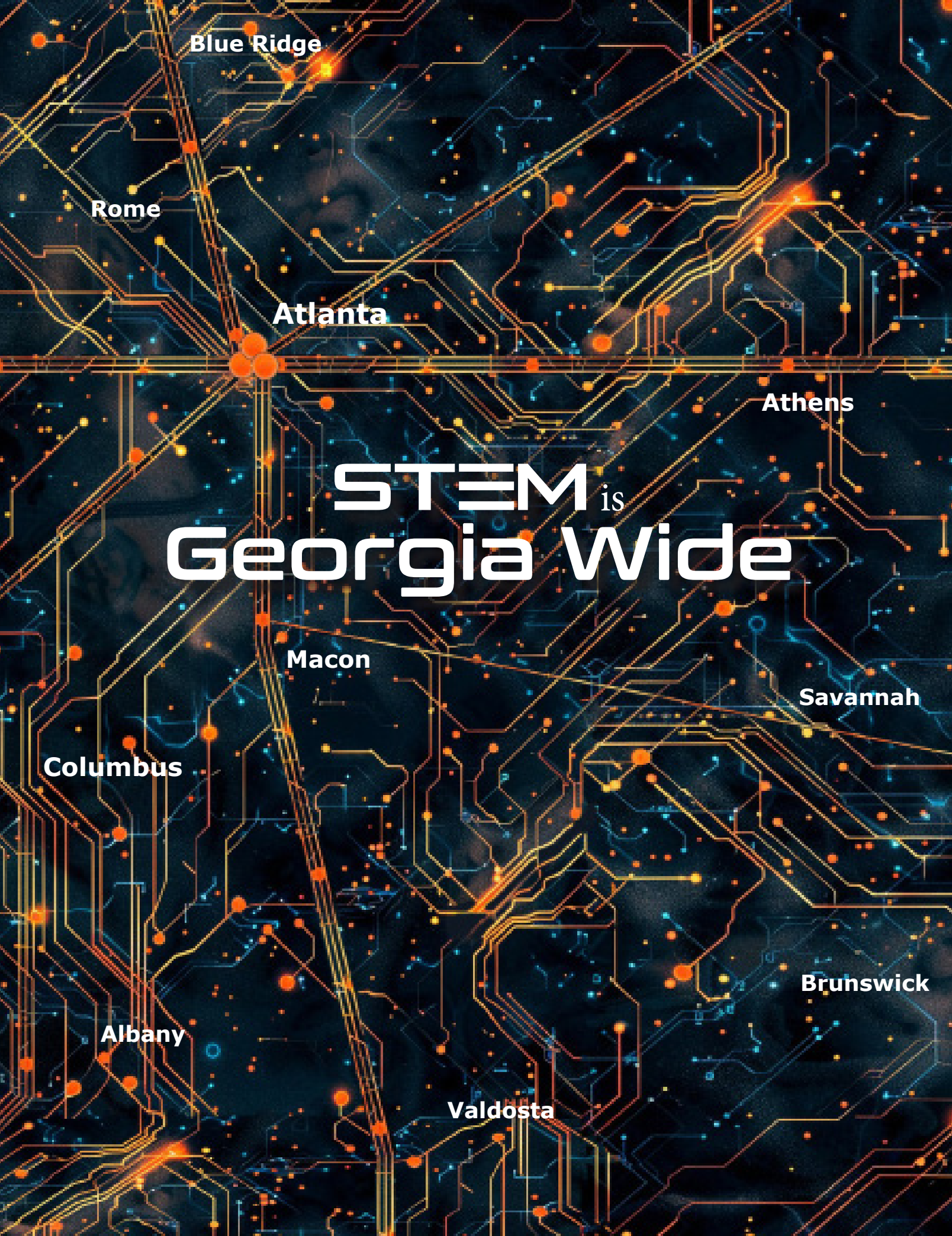
TV pundits and talking heads love to get riled up about whether robots are coming for our jobs — but the truth is that AI will probably create more jobs than it eliminates. And one thing's for sure: understanding how AI works, and mastering AI skills, will be the key to success in tomorrow's ever-changing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