May 2025



### Enhance Learning With A.I. Tools

Aviation Virtual Reality (VR)

**Introducing STEM In Primary Grades** 

WASP-12b

Webb Telescope ExoPlanet Discovery

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

Aviation Virtual Reality WAYNE CARLEY

**Diving Deep** Jerry Wooden / Learning Blade

Webb Telescope ExoPlanet

Roberto Molar Candanosa / Johns Hopkins University

Introducing STEM Early STUART NAISMITH A Foreword by TAG President and CEO, Larry K. Williams

Thank you for exploring the May 2025 edition of Georgia Pathways Magazine, your gateway to the world of STEM in education and industry. As Georgia remains at the forefront of STEM advancement, this magazine highlights the innovations, career pathways, and educational strategies driving progress and shaping the future.

In this edition, our lead article explores the role of artificial intelligence in education with "Enhancing Learning Using AI Tools," showcasing how AI is changing teaching methodologies and student engagement. For our younger learners, "Introducing STEM to Primary Students" offers creative approaches to instill a strong STEM foundation from the earliest years.

Readers will also explore Georgia's thriving maritime manufacturing economy and learn how innovation and practical experience come together in one of the state's most fascinating sectors. This issue also includes information on one of the most in-demand healthcare careers, providing students with insight into the science and technology that highlight modern medical diagnostics through radiology. Next, "Aviation Virtual Reality" showcases how virtual reality is used to train pilots and prepare them for careers in the aerospace industry.

Whether you're an educator seeking innovative classroom strategies, a student mapping out your career path, or a curious reader eager to explore the applications of STEM, we hope this issue of Georgia Pathways informs, engages, and ignites your passion for discovery. Beyond these pages, we invite readers to explore the Technology Association of Georgia's (TAG) extensive learning opportunities and groundbreaking innovations. TAG is dedicated to offering expansive opportunities for students and educators to engage with Georgia's thriving tech ecosystem. TAG serves over 30,000 members statewide and hosts more than 150 events annually, providing platforms for networking, professional development, and industry insights.

Through its 18 professional societies, TAG fosters communities across key tech sectors, including Fintech, Digital Health, Data Science & AI, and Smart Communities & Sustainability. Each society offers distinct opportunities for professional growth and collaboration through their events, which are open to TAG members and non-members. For more information about TAG or how to become engaged, please visit tagonline.org.

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.



TAG Technology Association of Georgia

### Enhance Learning With AI Tools

By Wayne carley

Artificial Intelligence and creative algorithm computer coding presents us with a wide variety of education tools, both in creative pursuits and literary applications. These AI tools offer capabilities to enhance education, while assisting with writing and research to create engaging learning experiences.

Tools like Grammarly help with writing and grammar, while Gradescope aids in grading and feedback. Interactive games, image manipulation and surreal videos also provide for unique applications within education and beyond into advertising and media applications. As with any tool, they can be used to benefit mankind as well as undermine it. The burden of responsibility, as usual, falls on the user to decide how and to what extent these tools are included in the classroom and society as a whole. It starts with a more complete understanding of the AI tool and deep consideration of its use or necessity, if any.

In the 1830s, a mathematician at Yale decided he needed to write on a blackboard. The elite Schoolboy Struggling with Math Problemsmethod of learning at Yale, up until that point, was called the recitation, where the professor and the student constantly recited and memorized work back and forth to each other. The idea that a professor



"For new technology to be adopted, it needs to enhance the work teachers are already doing, not just create a new set of bells and whistles that they have to worry about."

- Steven D. Krause

would use a blackboard was considered demeaning to the great recitators of Yale, and the students actually rioted when the professor introduced this radical new technology into his Yale classrooms. The students were expelled, and after a while, the trustees decided to reinstate the students, but only under the condition that they accept the blackboard. And, pretty soon, the blackboard spread like wildfire.<sup>1</sup>

In 1841, one educator declared that the blackboard's unknown inventor "deserves to be ranked among the best contributors to learning and science, if not among the greatest benefactors of mankind." Around the same time, another writer praised blackboards for "reflecting the workings, character and quality of the individual mind."

The fear of introducing new technology into the classroom and society is not new. Change is general ranks high on the list of things to pushback against, and in the case of AI and its unprecedented abilities to impact us, history may not be repeating itself. Is it different this time?

#### Grammarly

Grammarly is an English language writing assistant software tool. It reviews the spelling, grammar, and tone of a piece of writing as well as identifying possible instances of plagiarism. It can also suggest style and tonal recommendations to users and produce writing from prompts with its generative AI capabilities. This is a popular AI-powered writing assistant that helps ensure clarity, conciseness, and errorfree text in assignments, feedback, and lessons.

What strikes you most about the previous paragraph? The identification of flagrant plagiarism *(the practice of taking someone else's work or ideas and passing them off as one's own)* has value to keep students honest about what they claim as their original thought. Promising "error-free" text in assignments sounds good, if the student is the one who discovers the errors- thus the learning component.

Grammarly can be a tool of learning when used wisely and not depended upon in place of due diligence, much like spell-check for the ones we missed.

### AI Chatbots

An AI chatbot, such as ChatGPT, is a software program that uses artificial intelligence to simulate human conversation, usually through text or speech. Note the term "simulate". AI chatbots and virtual assistants provide help to students whenever needed. These assistants answer questions, **guide** students, and provide resources anytime of day. This means students can get help learning on their own and keep making progress in their studies. It should be a "learning" tool and not a substitute for mental effort.

These chatbots use AI algorithms to understand user questions, **interpret** their meaning, and provide, hopefully, appropriate responses, often learning and adapting over time based on user interactions. These new technologies could change how we teach and learn, making education more engaging, open, and efficient for both students and teachers.

### Gradescope (for the educator)

Gradescope is designed to make grading faster, consistent, and fair by providing

a centralized platform for the assessment process. Key features include: Rubric Creation, Collaborative Grading, Analytics, Paper and Digital Support, Coding Assignment Support and Integration with Learning Management Systems (LMS).

### Fireflies.ai

Fireflies.ai is an AI-powered meeting assistant that automatically transcribes, summarizes, and analyzes online and offline meetings, as well as record and transcribe in-person meetings. Fireflies.ai automatically transcribes meetings in various languages, including those spoken in different countries.

It can generate concise summaries of meetings, highlighting key points and action items and then analyzes the meeting content to identify trends, sentiment, and other important insights. It can integrate with popular platforms like Zoom, Microsoft Teams, and Google Meet to name a few.<sup>3</sup>

### HyperWrite

HyperWrite transforms complex topics into easy-to-understand explanations.

*"A.I. learning tools are not solely for the educational spaces, but importantly for the lifelong learners and industry professionals pursuing a more efficient and productive business arena."* 

Using advanced AI, this tool breaks down complicated concepts using relatable examples, analogies, and simple language, making it suitable for audiences across all age groups and expertise levels.<sup>4</sup>

This is a useful tool for education and industry needing to simplify technical concepts for a non-technical audience, break down a scientific theory or discovery into a more relatable explanation, teach a new skill or technique in a way that's engaging and easy to understand for beginners, or create educational content that's accessible to a wider audience in all age groups. Imagine needing to explain a complicated legal or financial matter in a way that's easy for clients or customers to comprehend.

The volume of AI apps continues to grow daily as society embraces its abilities. It's important that we continue to consider which may assist us in the classroom, at home or at work to potentially spur effectiveness, productivity and creativity.

We should always be concerned about finding and keeping a good balance between AI and the "human touch" in schools. AI may make learning more effective in theory while helping with school work, but the bond and influence between teachers and students is invaluable. Teachers give knowledge, guidance, support, and care that AI cannot duplicate. There is no app for empathy, understanding and human connection.



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### **Aviation Companies** Using Augmented and Virtual Reality in Aviation

By Wayne Carley



Research, operation and future considerations for augmented reality technologies have been expanding throughout the global aviation industry over the past decade, though published exploration of A/R can be traced back as far as the 1990s. We highlight some of the ways in which different areas of the aviation industry are using and evaluating future use cases for augmented and virtual reality technologies.

According to Intel, the official definition for augmented reality is computersuperimposed enhancements to a user's real-world environment, such as an oil pressure reading on a cockpit panel display. Virtual reality is defined as the creation of an environment by a computer that a person fully sees usually accomplished with goggles or a head-mounted display system. For example, using virtual reality, the user can experience stepping into an airplane avionics bay or cabin.

### **Pratt & Whitney**

Pratt & Whitney is no stranger to pushing new technologies forward. As far back as 2002, for example, Pratt & Whitney Canada announced an agreement with IBM and Dassault Systems to become the first company in the aerospace industry to develop engines using digital technology throughout the entire design and manufacturing process.

The United Technologies Research Center unveiled a collaboration with Pratt & Whitney's customer training division to invest in virtual reality engine maintenance training for airline mechanics. According to Bruce Hall, general manager of Pratt's customer training division, the company is currently beta testing in classroom environments the use of headsets and hand sensor controls that would allow mechanics to virtually walk inside a GTF engine to examine parts and view a running engine in motion.

#### **Aero Glass**

Aero Glass has a headset that pilots can wear and view cockpit control information like altimeter readings, fuel pressure, heading and oil temperature within a display that sits in the glass portion of the headset. Aero Glass made headlines in October 2016 when Airbus BizLab selected their technology as one to help become transformed into a business proposition.

The head-worn display concept has also received funding from the Euro-

pean Union's Horizon 2020 research and innovation program. Check out its 2014 YouTube video below detailing the concept.



#### **Air France**

Air France began testing Aug. 1 what it calls an "immersive entertainment system" with the use of virtual reality headsets that passengers can wear to view 3D and 2D films or television series.

The virtual reality headset is a result of the French carrier's partnership with SkyLights, an American-French startup company that was awarded 'Les As De L'Innovation' at the Paris Air Forum last July. Under the award, SkyLights will receive funding from Air France to expand development of its headsets.

Air France is testing the use of the headsets onboard its Airbus A340 flights between Paris-Charles de Gaulle and St. Martin. At the end of this test period, this new system could be rolled out on other flights in the months ahead, according to Air France.

### Air New Zealand

Microsoft describes its Hololens headset as a "fully self-contained holographic computer" with an optical system that works with advanced sensors and a holographic processing unit (HPU). The HPU is a TSMC-fabricated 28 nm coprocessor that has 24 Tensilica DSP cores. It has around 65 million logic gates, 8 MB of SRAM, and an additional layer of 1 GB of low-power DDR3 RAM. That RAM is separate to the 1 GB that's available for the Intel Atom Cherry Trail processor, and the HPU itself can handle around a trillion calculations per second.

Air New Zealand, in collaboration with IT service-provider Dimension Data, is beta-testing the use of HoloLens for its cabin crew. The airline envisions a future where flight attendants wearing a HoloLens headset can display passenger information on the headset such as flight details, time since last served



and even the emotional state of the passenger. The video above gives an overview of what Air New Zealand wants to do with the technology.

### **Bell Helicopter**

Bell Helicopter publicly unveiled for the first time its futuristic FCX-001 concept helicopter, with an airframe crafted from sustainable materials, a hybrid power system, an artificial intelligence co-pilot and morphing rotor blades that change to suit different flight conditions.

Bell's description of the virtual cockpit feature notes that the company sees "pilots of the future controlling the aircraft with the aid of augmented reality and an artificial intelligence computer assistance system." This would place future helicopter pilots in the role of safety and mission officer, while the computer assistance system flies with them.

Bell sees the virtual cockpit concept as a stepping stone to "fully autonomous un-piloted vertical-takeoff-and-landing air vehicles in the future."

### Boeing

Boeing announced the latest investment by its HorizonX venture arm, which was established earlier this year with the purpose of investing in startups for disruptive new aviation technologies. The latest investment positions Boeing within a group of investors funding Pittsburgh-based C360 Technologies' non-stitched immersive video in the world. Our live output for linear broadcast and OTT streaming platforms coupled with the industry's smallest pro-grade immersive camera is unique compared to others.

Boeing gave little details about future use of C360's capabilities, but did state that the "potential aerospace applications" include "more capable autonomous systems and other advanced platforms."

The future is here, with a shared focus on safety and accuracy. As amazing as VR is in its aviation applications, it's not a game, and there are no do-overs. As this interactive application expands in its technical abilities, we will see continued innovation for a more effective cockpit and a higher level of safety.



### 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.

### **Diving Deep:** Exploring Maritime Manufacturing as a STEM Career and the Power of Middle School Career Awareness

By Jerry Wooden

In the ever-evolving world of advanced manufacturing, few industries capture the imagination quite like maritime manufacturing. U.S. Navy vessels, built with precision and innovation, are not just technological feats — they represent a growing career field brimming with opportunities for future STEM leaders. However, to steer students toward this path, career awareness must start early, particularly in the middle grades.

# The Rise of Maritime Manufacturing as a STEM Powerhouse

The demand for skilled workers in maritime manufacturing is surging. Over the next decade, <u>4 million manu-</u><u>facturing jobs</u> will likely be needed and 2.1 million are expected to go unfilled. America's submarine industry alone will need to hire <u>250,000</u> skilled employees over the next 10 years to meet the Navy's growing shipbuilding demand.

As naval technology advances and demand grows, the Navy and their maritime industrial base partners are ramping up production, creating a wealth of career opportunities. Careers in this sector span mechanical engineering, robotics, materials science, and systems integration, offering a diverse array of roles for STEM enthusiasts.

Learning Blade, a STEM career exploration platform for grades 5–9, has launched a new Navy-funded mission, <u>"Beneath the Waves: Building Submarines"</u>, to address critical workforce shortages. The manufacturing and engineering-focused curriculum is now available to educators and students through Learning Blade, including in states where access has been fully funded





"My students like learning about different jobs. They enjoyed learning about the different things that go into making a submarine, and they were amazed at the fact that [subs] can just go underwater and stay in one place -- that they don't have to always go up or down. The whole concept of how a sub works is just amazing to them." - Kelly Conwell, 7th and 8th Grade STEM Teacher, Kosciuszko School, Hamtramck, MI.

The submarine mission arose through a unique collaboration between the U.S. Navy's Maritime Industrial Base Program, BlueForge Alliance, and Learning Blade. The custom curriculum promotes STEM career awareness, demonstrates academic relevance (through standards-aligned lessons), and fosters interest in maritime manufacturing, an industry that is vital to the nation's security.

This partnership immerses students in project-based learning and real-world problem-solving, effectively demystifying complex concepts and showcasing the tangible impact of STEM skills. In addition to the curriculum, through this collaboration educators and students have been able to connect with higher education programs, manufacturing companies, and former Navy officers through a combination of field trips and letter-writing programs to veterans.

### Why Middle School Career Awareness is Key

Research shows that early exposure to STEM careers significantly influences

students' long-term educational and professional choices. Middle school is a formative period where students begin to shape their identities and aspirations. With career interests and aspirations forming as early as age 10, the middle grades are the ideal time to start making connections between students' academic work and their future career paths.

"As a school looking to achieve National Blue Ribbon Status, Learning Blade has been so useful in meeting my school's goals of improving math and ELA scores, while still teaching science. Students can explore scientific and engineering concepts while also working on and practicing ELA and math standards. It's a win all around for the administration, the students, my teaching, and the school." - Scott Valenta, 6 - 8 Grade Science Teacher, St. John the Baptist Catholic School, Winfield, IL. By introducing students to STEM careers and sparking interest in essential industries like manufacturing, programming, and engineering, state leaders and district administrators are inspiring students to explore and learn about critical industries while paving the way for the workforce of tomorrow.

Mission-based learning increases STEM interest and breaks down barriers of perceived inaccessibility. Engaging, experiential learning allows students to



envision themselves as future engineers and innovators, fostering confidence and curiosity that carry into high school and beyond. Without awareness of fields like maritime manufacturing, many students may never consider these paths.

### **Building the Future Workforce**

Industry and education collaborations are essential for sustaining this talent pipeline. Programs that bridge classroom learning with industry practices not only enrich education but also build a workforce prepared to meet the evolving demands of maritime manufacturing. Career-connected learning initiatives emphasize the relationship between academics and future career paths while equipping students with critical thinking and problem-solving skills vital for success.

"In the classroom, students often ask, 'When am I going to need this in real life?" said Carrie Curtis, Ph.D., Education Initiatives Lead, U.S. Navy Maritime Industrial Base Program. "Learning Blade's mission-driven approach bridges academic gaps by integrating various contents to tackle real-world challenges.

At a pivotal stage in their personal growth, students are exposed to emerging technologies and career possibilities, allowing them to take charge of their educational paths moving forward. This strategy is essential for ensuring our nation remains competitive and ready to meet future workforce needs."

Ultimately, investing in middle school STEM career awareness isn't just about filling jobs — it's about empowering students to chart bold futures. By introducing maritime manufacturing as an exciting, viable career option, we inspire the next generation to dive deep into discovery, driving innovation beneath the waves and beyond.

### About the Author:

Jerry Wooden serves as President and CEO for eDynamic Learning. Jerry has worked passionately in the education market leading a variety of sales, marketing and operational teams for the past 20 years. Jerry has a Bachelor's Degree in Marketing Research from the University of Southern California.



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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.



### Webb Telescope Captures Its First Direct Images of Carbon Dioxide Outside Solar System

By Roberto Molar Candanosa

The James Webb Space Telescope has captured its first direct images of carbon dioxide in a planet outside the solar system in HR 8799, a multiplanet system 130 light-years away that has long been a key target for planet formation studies.

The observations provide strong evidence that the system's four giant planets formed in much the same way as Jupiter and Saturn, by slowly building solid cores. They also confirm Webb can do more than infer atmospheric composition from starlight measurements—it can directly analyze the chemistry of exoplanet atmospheres.

"By spotting these strong carbon dioxide features, we have shown there is a sizable fraction of heavier elements, such as carbon, oxygen, and iron, in these planets' atmospheres. Given what we know about the star they orbit, that likely indicates they formed via core accretion, which for planets that we can directly see is an exciting conclusion," said William Balmer, a Johns Hopkins University astrophysicist who led the work.

An analysis of the observations, which also included a system 96 light-years away called 51 Eridani, appears in The Astrophysical Journal. HR 8799 is a young system about 30 million years old, a fraction of our solar system's 4.6 billion years. Still hot from their violent formation, HR 8799 planets emit large amounts of infrared light that give scientists valuable data on how their formation compares to that of stars or brown dwarfs.

Giant planets can take shape in two ways: by slowly building solid cores that attract gas, like our solar system, or by rapidly collapsing from a young star's cooling disk into massive objects. Knowing which model is more common can give scientists clues to distinguish between the types of planets they find in other systems.

"Our hope with this kind of research is to understand our own solar system, life, and ourselves in comparison to other exoplanetary systems, so we can contextualize our existence," Balmer said. "We want to take pictures of other solar systems and see how they're similar or different when compared to ours. From there, we can try to get a sense of how weird our solar system really is or how normal."

Very few exoplanets have been directly imaged, as distant planets are many thousands of times fainter than their stars. By capturing direct images at specific wavelengths only accessible with Webb, the team is paving the way for more detailed observations to determine whether the objects they see orbiting other stars are truly giant planets or objects such as brown dwarfs, which form like stars but don't accumulate enough mass to ignite nuclear fusion.

"We have other lines of evidence that hint at these four HR 8799 planets forming using this bottom-up approach" said Laurent Pueyo, an astronomer at the Space Telescope Science Institute who co-led the work. "How common is this for long period planets we can directly image? We don't know yet, but we're proposing more Webb observations, inspired by our carbon dioxide diagnostics, to answer that question." The achievement was made possible by Webb's coronagraphs, which block light from bright stars as happens in a solar eclipse to reveal otherwise hidden worlds. This allowed the team to look for infrared light in wavelengths that reveal specific gases and other atmospheric details.

Targeting the 3-5 micrometer wavelength range, the team found that the four HR 8799 planets contain more heavy elements than previously thought, another hint that they formed in the same way as our solar system's gas giants. The observations also revealed the first-ever detection of the innermost planet, HR 8799 e, at a wavelength of 4.6 micrometers, and 51 Eridani b at 4.1 micrometers, showcasing



Webb's sensitivity in observing faint planets close to bright stars.

In 2022, one of Webb's key observation techniques indirectly detected carbon dioxide in another exoplanet, called WASP-39 b, by tracking how its atmosphere altered starlight when it passed in front of its star.

"This is what scientists have been doing for transiting planets or isolated brown dwarfs since the launch of JWST," Pueyo said.

Rémi Soummer, who directs the Optics Laboratory at the Space Telescope Science Institute and previously led Webb's coronagraph operations, added: "We knew JWST could measure colors of the outer planets in directly imaged systems. We have been waiting for 10 years to confirm that our finely tuned operations of the telescope would also allow us to access the inner planets. Now the results are in, and we can do interesting science with it."

The team hopes to use Webb's coronagraphs to analyze more giant planets and compare their composition to theoretical models. "These giant planets have pretty big implications," Balmer said. "If you have these huge planets acting like bowling balls running through your solar system, they can either really disrupt, protect, or do a little bit of both to planets like ours, so understanding more about their formation is a crucial step to understanding the formation, survival, and habitability of Earth-like planets in the future."

This research was supported by NASA through grant 80NSSC20K0586, with additional support from NASA through the JWST/NIRCam project, contract number NAS5-02105, and the Advanced Research Computing at Hopkins (ARCH) core facility (rockfish.jhu.edu), which is supported by the National Science Foundation (NSF) grant number OAC1920103.

Based on observations with the NASA/ ESA/CSA JWST, obtained at the Space Telescope Science Institute, which is operated by AURA Inc., under NASA contract NAS 5-03127.

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### Introducing STEM Careers Education In Primary Grade Levels

By Stuart Naismith



### The Need for Talk

There seems to be some debate as to whether Science, Technology, Engineering, and Mathematics (STEM) careers should be discussed in primary schools, or whether this is too early for pupils to be involved in such conversations, instead following the mantra of "let kids be kids" and so overlooking the topic.

I am old enough to remember not having internet in the house, having a mobile phone which could only call and text, and watching the remastered editions of Star Wars and thinking how cool the droids were; visions of a faroff future, if we were to ever get there. Recently though, I have had colleagues that have never known life without broadband, pupils with smart phones, spoken with a New York fireman about the FDNY's use of drones, and watched robots from Boston Dynamics doing parkour, including flips! So like it or not, technology is advancing at an incredible pace, impacting across the whole STEM spectrum. There are jobs that exist today that did not exist when I was a child, and there is also an increasing skills gap between what industry requires and skills of our young people coming through the education system, as well as a lack of diversity of genders and ethnicities within certain industries.

Statistics recently reported by WISE (Women into Science and Engineering) show that in September 2022, just over a quarter of the STEM workforce were women. This was even lower for the engineering and technology sectors specifically, where the numbers are 13% and just over 19% respectively.

When I was being assessed for the Primary Science Teacher Award in 2022, my classroom was visited by two members of the Primary Science Teaching Trust (PSTT). My class were excited to be visited by real scientists. Following their visit, one of my Primary 3 (Year 2) pupils said to their mum, "There were two scientists in my class today and none of them were men!" At face value, this could seem like an innocuous statement made by a 7-yearold, however I feel that it is a symptom of a much wider issue. And I think that many others would agree. Equally disturbing is that a report launched by Education and Employers in 2018, surveying 13,000 UK primary pupils aged seven to eleven about their career aspirations, found that children start to rule out STEM career options at an early age. A report by the OECD international think tank drew the same conclusions, with both reports identifying that there are multiple factors which affect the decisions about this including gender stereotypes, socioeconomic backgrounds, lack of role models, and representation in media.

With career aspirations starting to form at such an early age, surely children should have the opportunity to learn about different career possibilities, and encounter people who work in these roles, regardless of their gender or background? Wouldn't this be even more helpful if this took place while still in primary school to help broaden their horizons as they progress through their educational journey?

I feel that it is critical that teachers and parents are also aware of the changing career landscape and options, otherwise we run the risk of many children self-limiting their own future choices - especially those from marginalized groups. I believe therefore that primary schools and teachers have a critical role to play in this from an early age.

### Who and What Might Help?

At a very basic level, one way to easily introduce STEM career discussions in the classroom is to link the knowledge and skills being developed with those who require these for their careers. For example here are some ways I have used to associate classroom topics with careers in the past:

• Numeracy & Mathematics I teach about contexts in which budgets would be used like a financial accountant.

• Literacy I teach about functional writing which can be used for a career in journalism.

• When teaching about Physics and specifically refraction during STEM time I talked about lens technicians.

• When teaching about algorithms, sequencing and debugging in Computing, I also introduced the world of software engineering and coding

Role models also play an important role of raising the career aspirations of children. One of the key things I do personally as a STEM communicator is to produce monthly interviews on YouTube with people working in different STEM careers (https://www. youtube.com/@STEMwithMrN). This exposes children and young people to a diverse range of careers they may not have known existed, along with the diversity of ethnicities, backgrounds, genders and routes into STEM that exist. By hearing from a woman talking about her career in engineering, a Haitian who couldn't speak English when he started school in America, an IT director who quit university to take up an apprenticeship and a STEM program leader who quit an apprenticeship to go to university, our young people are exposed to people they may be able to identify with, to careers that speak to their interests, and to opportunities they did not know existed.

There are various resources out there which can also expose pupils to different potential role models, such as STEM Ambassador programmes, and A Scientist Just Like Me from the PSTT. Plus there are educational resources such as STEM themed story and activity books, combining learning STEM skills within immersive and interactive stories illustrating how children can follow a STEM career and get involved early in learning to enjoy STEM subjects.

A great example of this is 'The Antidotes: Pollution Solution' by global health expert Patty Mechael, which centres around a diverse group of middleschool children using STEM skills



to take agency of a local issue, and also comes with ready-made teaching resources.

Dr Thomas Bernard and Lisa Moss, owners of QuestFriendz, a STEM focused children's book publisher which produces books and educational resources to encourage and nurture a love of STEM learning suggest:-

"Educators, parents and the media should now all turn their attention to engaging a younger generation to build their confidence and curiosity of what STEM is and how a career in STEM is accessible, achievable and exciting. The classroom provides a perfect balanced environment for a discussion about careers in STEM, where accessible and diverse role models, both real life role models and fictional role models e.g. in books and movies, can be used to inspire and spark an interest from a young age."

Learning resources and programmes from providers can also help. One such is the charity Tech She Can, who produce free learning materials to inspire a younger generation of girls and women to study tech subjects and pursue tech careers, their animations make the subject accessible from ages of 5 onwards.

#### Animated lessons - TechSheCan.

Research commissioned by Philosophy with Children (UK), which was the rationale behind the charity, showed that only 3% of females would consider a future career in STEM, which would seem to evidence an immediate requirement to help redress this imbalance. In my opinion, there should never be barriers to people looking to enter into any STEM field, and as educators we have the power to remove those barriers by developing different skills, introducing career discussions in the primary school to tackle gender stereotypes, expose children to different careers and introduce role models but, ultimately, the choice is there for children to make while we help them discover the passion that lights a fire inside of them.





#### About the author:

Stuart is a multi-award winning primary teacher in Scotland, as well as being a STEM Communicator across social media platforms. He has a passion for engaging people of all ages in STEM education, but especially in explaining big topics in a child-friendly way, accompanied with practical activities to allow people to personally explore the concepts they are learning about. Stuart has undertaken training courses with the UK Centre for Astrobiology, the European Space Agency, and the Royal Observatory in Edinburgh.

He is a board member of the STEM-education charity SSERC, and of The Sustainables Academy, as well as a College Fellow of the Primary Science Teaching Trust. You can find STEM with Mr N at: https://www.youtube.com/@STEMwithMrN and by searching for STEM with Mr N across social media. Contact:

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# **GEORGIA PATHWAYS MAGAZINE**

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

### **Readership:**

Educators, K-12 Students, Parents, and School Administrators

Industry professionals

8%

8%

16%

68%

University professors and their students

Other interested individuals

### **Contact Us:**

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

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# **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
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- Exam voucher included
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**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!





# Al 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. <u>Register today</u> to get started with a career in tech.



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