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NEURON

Volume 21 Issue 2

Science, Technology & Research in West Virginia

SCIENCE & TECHNOLOGY

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A look at Vision 2030: West Virginia Science & Technology Plan

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This material is based upon work supported by the National Science Foundation under Grant No. OIA-2242771.

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VOLUME 21 ISSUE 2

EDITOR
Angela Sundstrom

ADDRESS
2001 Union Carbide Drive
Building 2000
South Charleston, W.Va. 25303

COVER PHOTO CREDIT
Marshall University

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ABOUT
STaR Division: Science, Technology & Research at the West Virginia Higher Education Policy Commission provides strategic leadership for the development of competitive academic research opportunities in science, technology, engineering and mathematics (STEM).

FUNDING
This material is based upon work supported by the National Science Foundation under Grant No. OIA-2242771. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

FROM THE SENIOR DIRECTOR

STARTING CONVERSATIONS

SCIENCE & TECHNOLOGY IN WEST VIRGINIA

Every five years, STaR is tasked with updating the state Science & Technology Plan. This is a collaborative effort with our Science & Research Council and various stakeholders across the state. Months of planning leads to dozens of interviews conducted by our friends at RTI International which are then compiled into a data-driven report highlighting the strengths and weaknesses of the current ecosystem. In short, a STEM blueprint for the state. The newest version was completed in 2025.


Rorrer

Vision 2030: West Virginia Science & Technology Plan identifies high-priority science and technology research areas of strategic significance to the state to align stakeholders around priorities that advance West Virginia's research enterprise and industry growth.

The plan focuses on high-priority areas that represent growing university-based research and educational activities aligned with West Virginia's target industries and workforce goals. This includes:

- Life Sciences: Health Science; Agriculture; and Natural Resources Resilience
- AI/ML and Data Science: Artificial Intelligence/Machine Learning; and Data Analytics and Data Science
- Advanced Manufacturing: Robotics and Autonomy; Manufacturing Efficiency; and Materials
- Advanced Energy: Energy Reliability and Efficiency; and Exploration and Production

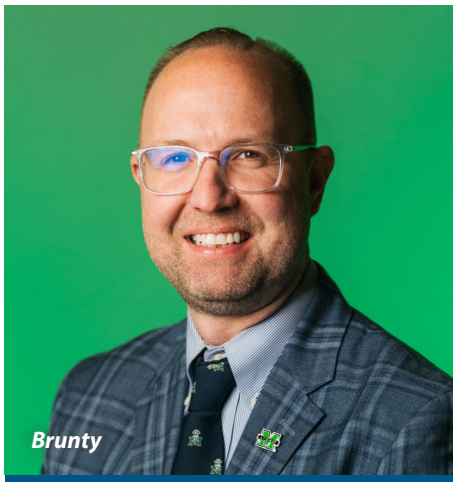
The plan also emphasizes the importance of continued investment in fundamental research and overall STEM education, from K-12 schools to community and technical colleges as well as regional and research universities.

The goal of this plan is to start conversations and connect stakeholders in order to advance its goals. Our first implementation committee meeting takes place at the beginning of June. We will continue supporting our STEM community by creating measurable actions based upon the recommendations in this plan. The future is filled with opportunity if we are willing to grasp it.

Janet

Dr. Janet Rorrer
Senior Director of Science & Research,
STaR Division: Science, Technology & Research,
West Virginia Higher Education Policy Commission

News briefings


Brunty

Marshall professor leads U.S. Cyber Team at International Cybersecurity Challenge in Australia

Marshall University professor and cybersecurity leader **Dr. Joshua Brunty** served as head coach of the United States Cyber Team during the International Cybersecurity Challenge (ICC) in Gold Coast, Australia in May.

Brunty, who has played a key role in developing cybersecurity talent on both the national and international stage, said the experience has reinforced the importance of preparing students for modern cybersecurity threats.

This marks the third and final time Brunty will serve in the head coach role for the national team. Following the competition, he will step away from his leadership position with the U.S. Cyber Team to focus his efforts on advancing Marshall University's cybersecurity initiatives and student programs.

WVU Tech professor and Fulbright Scholar selected as Fulbright Specialist

Dr. Yogendra Panta, professor of mechanical and aerospace engineering at West Virginia University Institute of Technology (WVU Tech), has been selected by the U.S. Department of State as a Fulbright Specialist.

As a Fulbright Specialist, Panta joins a network of academics and professionals recognized for their expertise. These scholars are invited to support short-term, high-impact projects at institutions abroad. Specialists work with host universities on specific needs, like curriculum development, faculty training, program assessment, or strategic academic initiatives.

Panta's academic discipline as a Fulbright Specialist falls under Engineering Education, specializing in higher education administration and organizational learning, assessment techniques and standards in higher education, pedagogy, design in engineering education, and evaluation of engineering education programs.

Panta was previously selected as a Fulbright Scholar in 2022. A native of Nepal, he returned to his home country after many years in the United States to facilitate faculty development and training workshops and build sustainable partnerships in engineering education.

"This recognition builds naturally on my earlier Fulbright U.S. Scholar experience, where I worked with engineering institutions to promote effective teaching practices, active learning, and faculty development," Panta said. "During that time, I led workshops, collaborated with faculty cohorts, and shared approaches related to teaching, mentoring, and early accreditation-focused practices. That experience was deeply collaborative and reaffirmed my commitment to global academic engagement grounded in mutual learning."

As a Fulbright Specialist, Panta's work will focus on supporting partner institutions abroad in areas where they seek targeted guidance, especially in strengthening higher education systems. This may include conducting workshops on outcomes-based education and assessment, mentoring faculty on curriculum design and continuous improvement, offering seminars on student-centered pedagogy, and advising academic leaders on building sustainable accreditation and quality assurance practices.

"Given my experience with ABET-aligned processes and faculty development, many of these engagements center on helping institutions develop practical, evidence-based systems that they can continue using long after the visit," Panta said.

"Serving as a Fulbright Specialist is both a professional honor and a service-oriented role. It allows me to continue contributing to higher education internationally while representing WVU Tech in meaningful academic partnerships."

News briefings

Reddy

WVSU's Reddy among World's Top 5% Scientists in new ranking

West Virginia State University (WVSU) Professor of Genetics and Biotechnology **Dr. Umesh K. Reddy** was recognized among the World's Top 5% Scientists in the 2025 Global Scientific Index and Scientist Ranking.

Reddy is internationally recognized for his pioneering work in plant genomics, crop improvement, artificial intelligence–assisted breeding, nutraceutical research and functional genomics using model systems such as Arabidopsis, Drosophila and C. elegans. His research program has contributed significantly to advances in specialty crop breeding, disease resistance, phytochemical biology and genomics-driven agriculture, while also providing training opportunities for undergraduate, graduate and postdoctoral researchers.

UC celebrates 10 years of innovation competition with i3 Showcase

The University of Charleston (UC) cut the ribbon on its Wehrle Innovation Center 10 years ago, pledging to foster innovation on campus. One of those initiatives, the annual i3 (Ideas, Innovation, & Invention) Showcase, now celebrates a decade of success.

Over 130 projects, from new business concepts and innovative product ideas to research, poetry, and art, have been entered by students, faculty and staff. Categories for entries include Innovative Solutions, Innovative Works of Art, Performance, Design, and Research.

"The purpose of i3 is to encourage and celebrate innovation across all areas of the university," said Dr. Travis Kahle, director of the Innovation Center and program director for the Innovation minor. "40 community leaders and professionals from the Charleston area served as judges. Previous i3 participants have gone on to start businesses or carry out their community service ideas, and they've made a positive impact on their communities. Much of the research presented at i3 is published. Since its inception, approximately 1000 innovative projects have been presented at the event."

Students, staff and faculty from nearly every program of study at UC compete for cash prizes in a wide range of innovation and research categories. Entries include new business ideas, community service projects, educational initiatives, paintings, poetry and primary and secondary research.

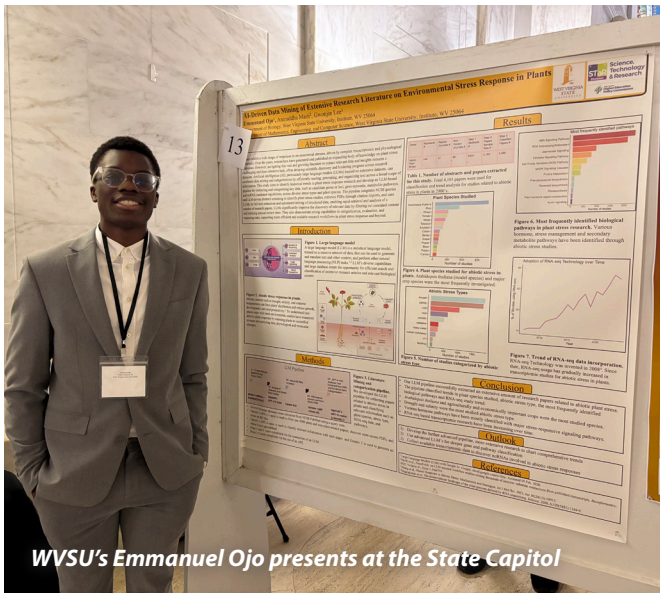
WVU to guide data-driven decisions for statewide opioid settlement funds

West Virginia University (WVU) is leading an effort to bring data, transparency and accountability to the allocation of nearly three-quarters of West Virginia's $1 billion in opioid settlement funding.

Commissioned by the West Virginia First Foundation, the WVU Health Affairs Institute, in partnership with the WVU Eberly College of Arts and Sciences Institute for Policy Research and Public Affairs and Data Driven WV in the WVU John Chambers College of Business and Economics, is conducting an 18-month, data-driven needs assessment to better understand substance use disorder through an evaluation of how the disease continues to affect people, families and communities across West Virginia. Called the West Virginia Wayfinder, this initiative is taking a comprehensive look at the scope of the opioid crisis, the services currently in place and how those services are funded.

Research Challenge Fund

Established by the State Legislature in 2004 to support research and development projects at institutions of higher education in West Virginia



WVSU's Emmanuel Ojo presents at the State Capitol

STaR continues sponsorship of Undergraduate Research Day

Undergraduate Research Day at the Capitol (URDC) took place on Tuesday, March 25 at the West Virginia State Capitol Complex in Charleston. URDC happens annually during the legislative session to provide further opportunities for lawmakers to have direct conversations with student researchers about how their funding is used and why it is important. This year's event featured 120 presentations from seven institutions with approximately 160 presenters in attendance. Topics included, but were not limited to: agriculture, biology, chemistry, computer science, engineering, mathematics, neuroscience, physics and more.

Annual Bridging Innovation Week hosted in Morgantown

Bridging Innovation Week (BIW) took place in Morgantown April 27 - May 1. This annual gathering for entrepreneurs and innovative leaders is a week-long catalyst for economic growth and creative collaboration across the Mountain State. Events included: the WV Entrepreneurship Ecosystem Annual Conference where thought leaders spoke on the future of West Virginia's entrepreneurial landscape; BIW's Competition Day where the state's most promising startups and small businesses pitched for funding and support; and partner events with a diverse lineup of networking, and specialized programming hosted by statewide partners.


Hatzis


Maiti

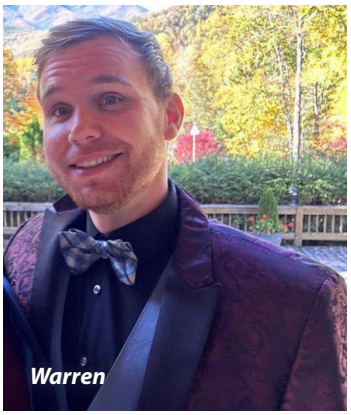

Murphy


Cole


DeLuca


Graham


Hossain


Warren

Faculty at seven West Virginia colleges and universities receive state funding to upgrade scientific equipment and enhance curriculum

Faculty at seven West Virginia colleges and universities were awarded approximately $174,000 in state-funded grants to purchase scientific equipment and enhance student opportunities on their campuses.

Instrumentation and Innovation Grants are primarily supported by the Research Challenge Fund, established by the West Virginia Legislature in 2004 to build research capacity and competitiveness at the state's colleges and universities. It is managed by STaR and matching funds are usually provided by the college or university.

Dr. Katherine Hatzis, assistant professor of chemistry at Concord University, was awarded $40,000 for "Purchase of Inductively Coupled Plasma – Optical Emission Spectrometer (ICP-OES): Elemental Detection in Teaching, Research, and Community Outreach."

Dr. Aniruddha Maiti, assistant professor of mathematics, engineering and computer science at West Virginia State University, was awarded $19,579 for "GPU Computing Setup for AI-Focused Undergraduate Education and Research."

Dr. Sytil Murphy, associate professor of physics at Shepherd University, was awarded $12,975 for "GPS Equipment for Teaching, Mapping, and Surveying."

Dr. Jacquelyn Cole, associate professor of chemistry at Shepherd University, was awarded $20,000 for "X-Ray Fluorescence Analyzer."

Dr. Mary Ann DeLuca, chair and professor of sport science at Davis & Elkins College, was awarded $19,990 for "Enhancing STEM-Based Exercise Science Education Through Advanced Instrumentation."

Dr. Zackary Graham, assistant professor of biology at West Liberty University, was awarded $19,418 for "Fostering Experiential Learning by Equipping WLU Students with Tools for Wildlife Telemetry and Genetic Analysis."

Dr. Kabir Hossain, assistant professor of computer science at West Virginia State University, was awarded $10,787 for "High-Performance AI Workstation for Secure Crop Disease Detection and Undergraduate Training."

Dr. Derek Warren, assistant professor of biology at Bethany College, was awarded $19,900 for "Fluorescent Microscope for Biomedical Education and Research."

NSF EPSCoR

National Science Foundation Established Program to Stimulate Competitive Research

A program that enhances research competitiveness of targeted jurisdictions (states, territories, and a commonwealth) by strengthening STEM capacity and capability through a portfolio of investments from talent development to local infrastructure

Grant No. OIA-2242771

WV-NFNT annual report highlights project successes

The WV Network for Functional Neuroscience and Transcriptomics (WV-NFNT) Year 3 annual report was submitted in March. Here are a few highlights:

Aim 1.1: **Dr. Eric Horstick's lab** is advancing circuit-tracing strategies for subcortical visual plasticity, including development of a stable transgenic line for photo-activable GFP tracing. The lab is also evaluating a newly published zebrafish neuron-to-neuron tracing approach to strengthen circuit-level interpretation. Initial zebrafish brain sectioning was completed to support MERSCOPE readiness, and this work with the Dr. Morgan Bridi lab has expanded into a publication and active grant discussions.

Aim 1.3: **Dr. Conor Sipe's lab** completed key objectives with undergraduate researchers, showing that neuroblasts and their progeny differ in their ability to reactivate from nutrient-induced quiescence. Aim 1.3.2 reagents were acquired and pilot staining completed, and four undergraduates are now running control/starvation experiments assessing effects on adult brain structures.

Aim 2.3: **Dr. Umesh Reddy's lab** established a robust, frozen-compatible snRNA-seq workflow for adult Drosophila brains, enabling cell-resolution analysis of diet- and sex-dependent transcriptional changes. Integrated differential expression revealed that whole-brain signatures arose from specific neuronal and glial populations rather than uniform cellular responses. Dietary capsaicin was linked to sex-dependent transcriptional remodeling of peptidergic neurons, insulin-producing cells, and glia, uncovering TRPV1-independent and sexually antagonistic regulatory programs.

Aim 2.4: **Dr. Mary-Louise Risher's lab** is investigating changes in synaptic structure in the brain of adolescent rats in response to binge drinking. This project is on track and spatial transcriptomics data from brain sections using the 10X genomics platform have been collected. These are now undergoing alignment and analysis in collaboration with Dr. Sadia Akter, the new WV-NFNT bioinformatics faculty hire at Marshall University.

David Cartwright and students

STEM Alliance officially launches at URDC

The West Virginia STEM Alliance officially launched at the West Virginia Culture Center on February 19 following Undergraduate Research Day at the Capitol (URDC).

This event featured undergraduate students from Marshall University participating in a panel discussion, along with a keynote presentation by Drs. Lonnie Thompson and Ellen Mosley-Thompson. Breakout rooms were offered to highlight research opportunities, including the SURE and INBRE programs.

With a strong focus on Appalachian communities, the alliance aims to increase the number of students pursuing degrees in science, technology, engineering, and mathematics (STEM) while boosting collaboration.

This initiative was previously led by Marshall University's **Dr. Tina Cartwright** with **Drs. David Cartwright and Rosalynn Quiñones-Fernandez**, also from Marshall, leading it into the future. The alliance is a West Virginia Network for Functional Neuroscience and Transcriptomics (WV-NFNT) Education and Workforce Development activity.

Quiñones-Fernandez and students

Horstick presenting at Shepherd

Researchers collaborate statewide

WV-NFNT researchers continue to collaborate across West Virginia. Last fall, West Virginia University's **Dr. Eric Horstick** visited Shepherd University to deliver a research and career seminar to more than 50 undergraduates. Horstick encouraged students to get involved in scientific discovery by seeking hands-on research opportunities.

Gross (center) with Dr. Janet Rorrer and Dr. Quinn Clark

WVU's Jason Gross headlined STEM Speaker Series in Charleston

Dr. Jason Gross presented to a crowd of approximately 50 attendees at the West Virginia Culture Center in October 2025. Gross is chair and professor in the Department of Mechanical, Materials and Aerospace Engineering at West Virginia University. His presentation offered all ages a chance to experience modern robotics with hands-on demonstrations. This event was partially paid for by the NSF EPSCoR Track-1 project. The STEM Speaker Series has been offering free scientific presentations to the public since 2014.

Advancing Innovation

A look at Vision 2030: West Virginia Science & Technology Plan

By Angela Sundstrom

West Virginia's newest science and technology plan calls on the state to redouble its efforts and move forward in advancing the role of education, research and innovation in its economy.

Vision 2030: West Virginia Science & Technology Plan (Vision 2030) identifies high-priority science and technology research areas of strategic significance to align stakeholders around priorities that advance West Virginia's research enterprise and industry growth.

"Our mission is for West Virginia to compete and succeed in the global economy by increasing research capabilities and cultivating a highly skilled STEM workforce," said **Dr. Janet Rorrer**, senior director of science and research in STaR Division: Science, Technology & Research (STaR) at the West Virginia Higher Education Policy Commission. "Through Vision 2030, we are advancing economic diversification rooted in innovation and talent."

STaR and the state Science & Research Council developed Vision 2030 with RTI International and Keen Point Consulting. It was approved and adopted by the Council in June 2025. A full digital version is available online at wvresearch.org.

"It has been a pleasure working with Janet Rorrer and the Science and Research Council to develop West Virginia's next science and technology plan. The plan aims to prepare students for high-demand STEM careers, bolster research and innovation activity, and make West Virginia a premier hub for science and technology-driven companies," said **Jennifer Ozawa**, senior economist for innovation and economic development at RTI International.

"I am always impressed by the dedication and proactive involvement in the plan from representatives at every level in the state—business, higher education, and state government. West Virginians care deeply about their state and are relentless in their pursuit of a stronger economy that will provide good economic opportunities for the next generation. This sustained commitment will empower West Virginia to write its next chapter over the coming decades."

R&D-Intensive Industry

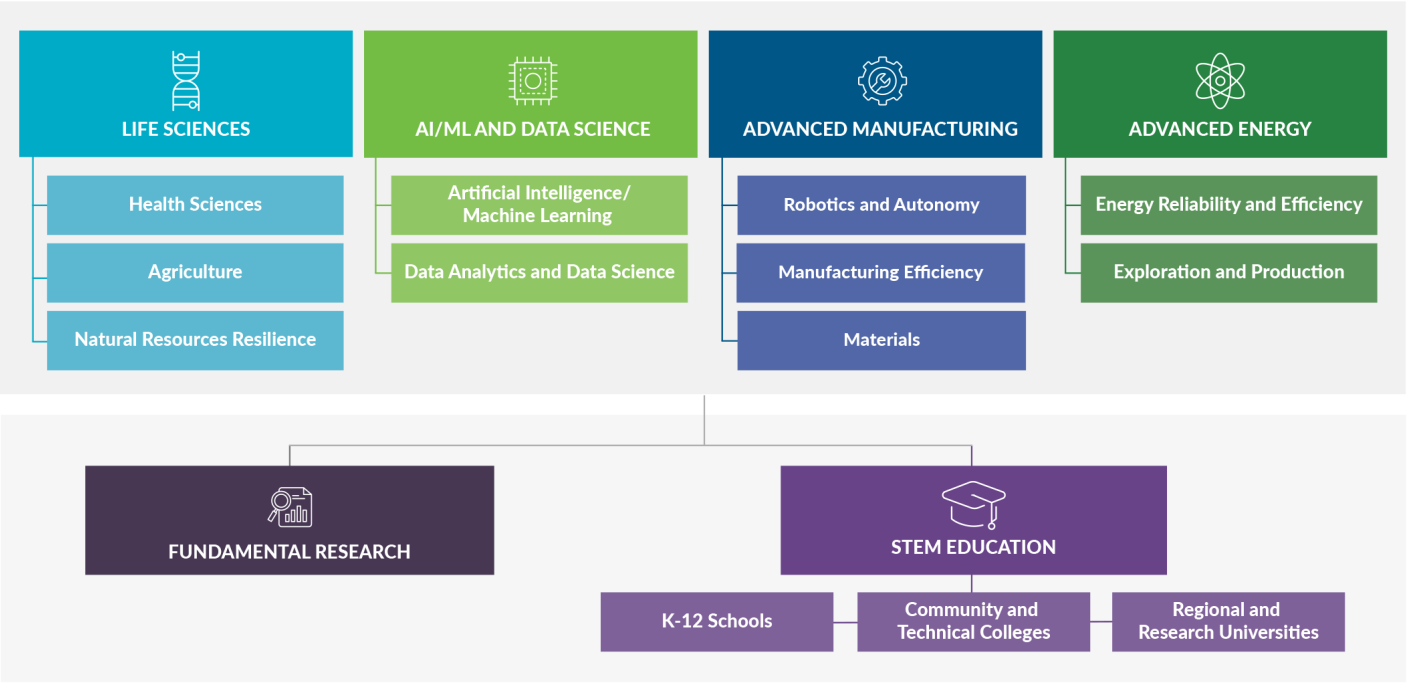
West Virginia companies must adopt technologies that improve quality, productivity and performance to be competitive in a global economy. This includes introducing new or improved products to the marketplace.

Nationally, companies that report performing more research & development (R&D) also report more innovation activity and companies in more R&D-intensive industries tend to report higher sales growth, employment and wage growth. This can help increase market share or create new business, driving both sales and job growth.

"Research and development-intensive industries are critical catalysts for West Virginia's economic future and align perfectly with our core growth objectives," said **Matt Herridge**, West Virginia Secretary of Commerce. "The Vision 2030 Science & Technology Plan provides a vital roadmap to transition cutting-edge research into market-ready commercial success. By fostering an ecosystem that supports high-tech innovation, the Department of Commerce is actively working to diversify our economy, strengthen our industrial sectors, and create the high-paying, sustainable jobs that keep our workforce globally competitive."

West Virginia's current top industries are mining and extraction, health care and real estate. Thirty years from now, with innovative investments, West Virginia's economy could look much different with the addition of advanced manufacturing and scientific services.

Photos courtesy of Marshall University and West Virginia State University



Above: Vision 2030 identifies high-priority research areas that build on West Virginia's existing academic and industrial research strengths. Growth in research and the number of faculty and students working in these areas will support the long-term competitiveness of key industries. (Artwork by RTI International)

Since 2020, West Virginia has experienced higher growth rates in R&D-intensive manufacturing and services industries relative to all manufacturing and all services employment. Although West Virginia is starting from a smaller base of companies and industry, the state can continue to increase this number by ensuring it has the right incentives, physical infrastructure and workforce to provide a competitive business environment.

STEM Talent

STEM workers can be scientists, engineers and health care professionals as well as skilled technicians like construction trades, chemical operators and maintenance.

With the adoption of robotics and software-enabled automation, employment of STEM workers nationally is projected to grow faster, with a 1 percent compound annual growth rate, through 2033.

Employment by occupation data shows that West Virginia employment in science and engineering related jobs grew faster, 1.6 percent per year since 2019, than unrelated jobs. The fastest growth was technology and health care jobs.

"Our STEM workforce — from scientists and engineers to health care professionals and skilled technical workers — is growing faster than the rest of the labor market, both nationally and here in West Virginia. Yet, demand is outpacing our talent pipeline, especially in high-growth fields like IT, advanced manufacturing, and health care, putting our competitiveness at risk. By strengthening STEM education and training pathways, we can fuel innovation while opening doors to high-quality, well-paying careers for West Virginians," said **Dr. Sarah Armstrong Tucker**, West Virginia's Chancellor of Higher Education.

According to industry stakeholders RTI interviewed for this report, STEM jobs are in high demand, but there are not enough skilled workers to fill them. This will increasingly impact West Virginia's competitiveness and growth of R&D intensive industries, such as advanced manufacturing, IT and cybersecurity, the life sciences (health care, agriculture, forests) and advanced energy. Strengthening the pipeline of STEM talent supports West Virginia's business competitiveness and also creates pathways to high-quality, well-paying jobs for West Virginians across a range of educational backgrounds.

"Our K-12 students are making decisions about areas of interest earlier and earlier," Tucker said. "As we continue to work together to build STEM pathways, internships, and research experiences, we increase our state's future STEM workforce."

Research Enterprise

West Virginia's research enterprise impacts many of the state's other science, technology and economic goals.

Academic R&D plays a critical role in the training of future scientists and engineers by providing hands-on experiences that require teamwork and problem-solving skills. Research experiences can help retain students in their STEM degree programs. External research funding is also an important source of financial support for graduate students, as well as undergraduates engaged in research over the summer or during the semester, helping to offset tuition and other costs.

Academic research also helps faculty stay current in their field and drives scientific discovery and technology development. Research can lead to novel discoveries and the creation of intellectual property that could form into start-up companies. Research is also one way companies engage with academic institutions to access faculty subject matter experts or to utilize specialized equipment needed to support projects to resolve technical problems with a product or manufacturing process or develop and commercialize new products, technologies, and processes.

"By strengthening STEM education and training pathways, we can fuel innovation while opening doors to high-quality, well-paying careers for West Virginians."

- Chancellor Sarah Armstrong Tucker

West Virginia experienced very strong growth in academic R&D expenditures for several years, moving from $211.7 million in 2019 to $304.3 million in 2024. This growth was driven primarily by increases in federal research dollars awarded. West Virginia was also able to attract and retain graduate students as doctoral degree recipients increased by 4.6 percent per year, totaling 153 in 2023.

"West Virginia's recent gains in research and STEM talent underscore our capacity potential for continuing the transition toward an innovation and technology-driven economy," said **Dr. Sheena Murphy**, associate vice president for research development at West Virginia University.

With the decline in federal research funding, state support for STEM such projects will have an opportunity for real impact. Many other states will increase their state support for STEM research and education, making it even more important for West Virginia to do the same to stay competitive. Vision 2030 calls for examining best practice financing models in other states and then raising funds to help West Virginia compete for industry and federal research dollars.

Innovation & Entrepreneurship

West Virginia needs more innovative, higher-growth companies. This can be accomplished by starting new entrepreneurial ventures and by recruiting existing companies looking to expand.

"Technology-based entrepreneurship has increased greatly in West Virginia over the last twenty years, with spinouts from our universities and startups from people leaving industry, leading to significant job growth and investment. But we are still far behind both our neighboring states and other states similar to West Virginia," said **Kevin DiGregorio**, executive director at the Chemical Alliance Zone.

There is no federal data source for tracking the number of R&D-intensive or technology-based startups in each state so policymakers look to a variety of indirect indicators. This includes patents, SBIR/STTR awards and venture capital.

Increasing R&D collaboration with industry is one way to expose faculty and students to the type of technical challenges that companies are working on. These relationships can help develop the network of industry subject matter experts who can advise faculty on tech transfer opportunities that arise.

Interviews with stakeholders representing private and state-supported investors and entrepreneurial support organizations indicate that West Virginia's entrepreneurial ecosystem and investor community are collaborative and engaged. However, there are a limited number of experienced startup founders, and academic inventors often lack the industry experience and business development experience needed to launch successful new ventures.

"We need state support to go along with all of the work being done by groups in the innovation ecosystem to significantly increase our innovation output," DiGregorio said. "It will be very difficult to recruit large R&D groups to the state, so we need to focus on startups, investment capital and funding to the organizations that are working with entrepreneurs to grow our innovation economy and create high-paying technology jobs for our people."

Commentary
Cliff Sullivan


Sullivan

Investing in West Virginia's STEM talent is one of the smartest long-term strategies for our state, especially as artificial intelligence (AI) and data centers reshape the modern economy and workforce.

These sectors rely on a skilled workforce in computer science, engineering, cybersecurity, data analytics and other advanced technical fields. If West Virginia wants to attract high-value employers and compete for the jobs of the future, we must continue building a conduit of students and workers who are ready to lead an increasingly digital economy.

The case for investment strengthens as we position ourselves for growth in AI, cloud computing and data infrastructure in West Virginia. State leaders have promoted policies to attract data centers, increasing the demand for artificial intelligence and cloud services. These opportunities will require more than power and land; more importantly, they will require technicians, engineers, IT specialists, construction workers and problem-solvers trained through strong STEM education and workforce programs.

Investing in STEM talent benefits West Virginia communities as well as its economy. This is especially important in rural areas, where access to high-paying, future-ready careers has often been limited. By strengthening partnerships among K–12 schools, colleges, and industry, students in every county can access advanced courses, industry-recognized credentials, internships, apprenticeships and career pathways that prepare them for success without requiring them to leave their hometowns. Each new engineer, cybersecurity analyst, healthcare technician, software developer or skilled trades professional reflects a young person gaining the chance to build a meaningful career close to home. STEM education also inspires students by helping them see possibilities for their future that they may not have considered before.

"West Virginia has the talent, institutions, and opportunity to compete in a fast-changing economy."

- Cliff Sullivan

West Virginia has the talent, institutions and opportunity to compete in a fast-changing economy. Continued investment in STEM education and workforce development will not only prepare students for the jobs of tomorrow; it will also help the state seize emerging opportunities in AI, data centers and advanced industry. By investing now, West Virginia can strengthen communities, support innovation and create a more prosperous future for the entire state.

***Cliff Sullivan** is currently Coordinator, Computer Science and AI at the West Virginia Department of Education.*

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