Key Takeaways and Opportunities

The theme for the 2024 ORAU Annual Meeting of the Council of Sponsoring Institutions was Redefining the Next Generation STEM Enterprise. Key takeaways from the keynote addresses and panel discussions, along with engagement opportunities for members of the ORAU University Consortium, are outlined below.

OPENING KEYNOTE ADDRESS: **SUDIP PARIKH**

CHIEF EXECUTIVE OFFICER AND EXECUTIVE PUBLISHER, SCIENCE JOURNALS, AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS)

KEY TAKEAWAYS

- There are step-function leaps we can take in every natural and social science discipline. We live in extraordinary times, and we also live in uncertain times. It's a golden age for science—every discipline!

- We are in the middle of two existential races: We're in a race to solve big problems for humanity. We're also in a competition globally for the scientific workforce, and we're losing. Lots of nations are investing in science, and we're competing with demographic giants that are three and four times the size of the United States.

- We must ensure we have the talent in the United States to compete globally.

OPPORTUNITIES

- The STEMM (Science, Technology, Engineering, Mathematics, Medicine) Opportunity Alliance is a national effort of the AAAS in partnership with the Doris Duke Foundation to galvanize stakeholders for STEMM excellence and equity by 2050. This effort will bring together organizations and entities from across sectors and scientific communities that are committed to developing and advancing a national strategy for achieving shared goals in STEMM equity. ORAU is an Anchor Partner for the STEMM Opportunity Alliance Pillar 3: Discovery – Creating Opportunity for All in Higher Education. More information: https://stemmopportunity.org/

- AAAS is a green open access publisher as of 2023. This means authors can achieve public access at no charge. Senior scientists need to lead the revolution toward open access publishing.

- EurekAlert!, the AAAS online newsroom, fosters inclusiveness and helps democratize the world of science. The platform spotlights high-quality science that might otherwise remain under the radar because it's not associated with Carnegie R1 institutions. Research at R2 and R3 institutions is highlighted as well. More information: https://www.eurekalert.org/

Panel Discussion: **Building a Future-Resilient Workforce**

Moderator: Tiffani Connor, ORAU

Panelists: James Brown, Executive Director, STEM Education Coalition; Gabriela Cruz Thompson, Senior Director, University Research and Collaboration, Intel Labs; Joyce Malyn-Smith, Co-PI, STEM Learning and Research Center, Education Development Center, Inc.; Carol O'Donnell, Senior Executive and Director, Smithsonian Science Education Center; Alex Swartsel, Director, Center for Artificial Intelligence and the Future of Work, JFFLabs, Jobs for the Future

KEY TAKEAWAYS:

- Beyond the acronym, STEM, we must explain what science, technology, engineering and mathematics mean to the community and future workforce. Bringing prosperity to local neighborhoods is just as important as growing personal prosperity. In terms of STEM, we need to foster the sense of identity in being a part of something bigger than ourselves.

- All types of people are going to be needed to fill the STEM pipeline. We need people with social skills, emotional intelligence and communications skills as much as we need people with skills in the sciences.

- We need to encourage learning for the sake of learning and open more access points to opportunity. We live in a world where people can engage in a few months of education to gain a new skill to improve their life. Skills and talents required for the STEM pipeline: core competencies, resilience to shocks and stressors, future-thinking, systems-thinking, collaboration, interdisciplinary teamwork and consensus building, and critical thinking and confidence in mathematics skills.

OPPORTUNITIES:

- Look for opportunities to collaborate with people who may not have worked together before. Competition of teams as opposed to competition of individuals.

- Work with industry partners to identify new skills needed in the workforce in your community, region, state, etc. and support entrepreneurship as a necessary skill set.

- Spend more time communicating face-to-face with policy makers so they understand what you're dealing with as an organization.

- Intentionally try to attract students who have dropped out of the education system. We need to bring them back into the fold with certificate or micro-certificate programs, alternate credentialing programs and project-based learning.

- Remember that AI is a tool. We shouldn't be afraid to integrate it into our strategies. Ultimately, we still need humans to maintain control of what is produced – AI can make people more productive, but humans will always be necessary.

- The Smithsonian Science and Education Center is already working toward these kinds of goals. For inspiration and support: https://ssec.si.edu/global-goals

KEYNOTE ADDRESS: **ELIZABETH ALBRO**

Commissioner of Education Research, Institute of Education Sciences, U.S. Department of Education

KEY TAKEAWAYS:

- The federal investment in education research is woefully small compared to other institutions in the federal research enterprise. While the Institute of Education Sciences (IES) does great work with the resources they have, the lack of research is a challenge.

- We need to think about broadening participation in STEM much earlier in the lives of students. Universal screening policies are designed to screen every child to determine access to gifted education programs. This approach removes parents and teachers from the nomination process and thereby can remove barriers, especially for underserved children and communities.

- Career and Technical Education and Dual Enrollment Programs demonstrate increased college enrollment and participation in STEM education programs and careers.

- Corequisite Enrollment demonstrates an increased completion of credit-bearing courses – we know of adults right now who have the skills and knowledge for STEM careers.
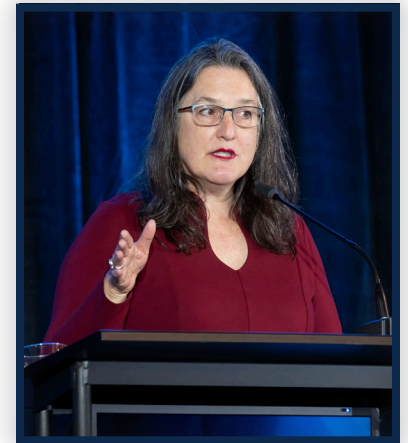
OPPORTUNITIES:

- Apply for research funding from the Institute for Education Sciences, the independent non-partisan research arm of the U.S. Department of Education. Information about funding opportunities and Requests for Applications can be found here: https://ies.ed.gov/funding/

- Ten Regional Educational Laboratories partner with educators and policymakers nationwide. This work is change-oriented and supports meaningful local, regional or state decisions about education policies, programs and practices designed to improve learner outcomes. https://ies.ed.gov/ncee/rel/

- Evidence-based Pathways to Colleges and Career: What Works Clearinghouse, free library of evidence-based resources available to educators at all levels. https://ies.ed.gov/ncee/wwc/

- Utilize Postsecondary Student Success Grant Program, which is a grant program designed to equitably improve postsecondary student outcomes, including retention, transfer, credit accumulation and completion by leveraging data and implementing, scaling, and rigorously evaluating evidence-based activities to support data-driven decisions.

- Encourage institutional leaders' commitment to inclusive student success. Learn more: https://www2.ed.gov/programs/pssp/index.html

- Sign up for the IES Newsflash: https://ies.ed.gov/newsflash/#ies

Panel Discussion: Equitable Access for an Innovation Economy

Moderator: Tracy DiGioia, MITRE

Panelists: Lizanne DeStefano, Executive Director, Center for Education Integrating Science, Mathematics and Computing, Georgia Tech; Diana Gehlhaus, Director for Economy, Special Competitive Studies Project; Gregory Goins, Associate Dean for Research, College of Agriculture and Environmental Sciences, North Carolina A&T State University; Todd Mann, Executive Director, National Consortium of Secondary STEM Schools

KEY TAKEAWAYS:

- It's imperative to demonstrate to young people that there are a lot more career pathways in STEM than just working at NASA. We lack education champions in many local spheres of influence. Through the tyranny of credit hours, we silo STEM language. Instead, we need to facilitate smooth transitions from one discipline to another.

- Industry is the most powerful advocate for equitable access because they want a more diverse and inclusive workforce.

- We need to replace the mindset that you need a four-year degree to have a career in STEM. Stackable credentials, Career and Technical Education and the resurgence of skills-based hiring doesn't seem to be taking hold in STEM because of the bias toward four-year degrees. The cyber workforce has shown us there is a way to create different pathways, but the incentive doesn't seem to be there.

- Removing barriers to STEM must be built into the system from the earliest ages (i.e., create more entry points through regional investment).

OPPORTUNITIES:

- Look for partnership opportunities with industry in your community, region and state to meet the workforce needs. There can be challenges because some of the programs are established with good intentions, but there is little evidence to demonstrate that they are effective.

- Like college fairs, bring industry options to students to open eyes and minds toward career choices not previously considered.

- When planning outreach and marketing communication, strategically target teachers, families and communities as well as students.

- Try a STEM influencer network similar to the program Georgia Tech created so that every county in the state has connections to like-minded people and fields, all funneling through Georgia Tech.

Panel Discussion: ORAU STEM Accelerator

Moderator: Lt. Gen. (Ret.) John Regni, ORAU Board of Directors

Panelists: John Dyer, Associate Vice President, Workforce and Economic Development, American Association of Community Colleges; J. Wesley Hines, Nuclear Engineering Department Head, Chancellor's Professor, Co-Chair, Education/Workforce Committee Chair, Tennessee Nuclear Energy Advisory Council, University of Tennessee; Nakeisha Ricks-Pettyjohn, Senior Fellow, Workforce Development, National Skills Coalition
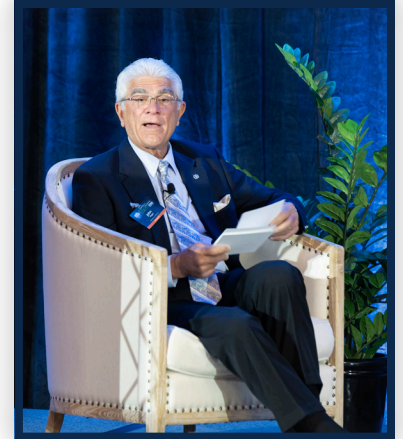
KEY TAKEAWAYS:

- For the past several decades, the United States has lost ground to competitor countries in STEM fields. ORAU is on a mission to get the nation back on track as fast as possible through a new program called ORAU STEM Accelerator (OSA). Under this umbrella, universities, community colleges, trade schools, industry members and professionals will come together to identify STEM pipeline challenges and create formulas to dismantle the obstacles.

- A wholistic approach to recruitment, training and retention of those in STEM disciplines proves most successful. We need to think outside the box of traditional methods and pipelines such as standardized tests and four-year degrees from applicants in the same communities.

- ORAU looked to its roots—Oak Ridge's history in nuclear energy—and used that as the case study for OSA. With so many macro concepts within nuclear energy, OSA narrowed its focus to the generation of nuclear energy. With this identified, OSA pulled together 10 ORAU consortium members who are leading experts in this specific field, as well as representatives from community colleges and technical schools, industry professionals, relevant members of the government and research labs. This group will serve as a think tank to determine the key barriers and solutions to improve.

- Two-year institutions, community colleges and tech schools, enroll almost 50% of the nation's undergraduates and serve the majority of underrepresented student populations. Federal and state workforce development policies, strategies, and advocacy campaigns that address equity, access, and economic mobility barriers for workers are critical success factors.

OPPORTUNITIES:

- Work-based learning such as internships and apprenticeships reduce workplace mismatch. Look for opportunities to expose children to a variety of STEM career options and give more adults easy access to trying something new through badging and certifications.

- We need to create environments for industry members to come to the university (or community college or trade school) to tell them what's coming down the road. This allows schools to prepare grads in anticipation of workforce needs. Through previous conversations of nimbleness, academic intuitions can pivot to offer new minors such as cyber security and decommissioning for those with nuclear science degrees.

- When suggested learning paths mean change, partner with schools to lessen the administrative burdens of changing curriculum.

- This is a true opportunity to foster diversity of thought because all ideas are welcome as experts sort through possibilities. To learn more: STEM Accelerator | ORAU

Panel Discussion: **Strategic Alliances to Advance the K-16 Education Ecosystem**

Moderator: Sam Visner, Aerospace Corporation

Panelists: Courtney Brafford, Director, UofM Global, University of Memphis; Dennis Foutz, Lead, University Consortium for Applied Hypersonics, Joint Hypersonics Transition Office, U.S. Department of Defense; Ashley Greeley, NCAE-C K-12 Mission Lead, Center for Education, Innovation and Outreach, National Cryptologic University, National Security Agency; Scott Lucas, President, National Coalition of Advanced Technology Centers

KEY TAKEAWAYS:

- While STEM disciplines are related, they are not the same. Each area has its own strength of resources as well as unique challenges. STEM leaders need to define similarities and differences and learn from those in similar (but different) fields.

- It's hard to build alliances and partnerships when there is a general lack of understanding of STEM and the opportunities therein. Even job descriptions (especially at the federal level) are barriers to potential great hires. We need to educate all within proximity to STEM to lay a stronger foundation of what it is and what it isn't.

- Be bold and decisive. We don't have time to waste.

OPPORTUNITIES:

- Find gap-integrators like mechanical engineers for the field of hypersonic science. People who traditionally serve in one area may be an incredible asset to bridge divides in a related discipline.

- There are prolific challenges to the STEM pipeline like education desserts and systems integration. Use a known need such as cyber operations to build infrastructure in these regions where other opportunities don't exist. Create a network that feeds into interconnected fields.

- For those who are outside looking in when it comes to funding, link up with other programs to enter the ecosystem, and from there, submit your own proposals.

- We can start in primary education by embedding competency in K-12 and strengthening feeder programs (middle school to high school, high school to college, two-year to four-year programs).

- Start now: we have the opportunity to re-skill and up-skill job-seeking adults.

KEYNOTE ADDRESS: **HASSAN KHAN**

Senior Advisor for Economic Security, CHIPS for America, U.S. Department of Commerce

KEY TAKEAWAYS:

- Through the CHIPS for America program, by the end of the decade, the U.S. will (1) have at least two new large-scale clusters of leading-edge logic fabs, (2) U.S.-based engineers will develop the process technologies underlying the next gen of logic chips, (3) our fabs will produce high-volume memory chips on economically competitive terms, (4) research and development for next generation memory technologies critical to supercomputing and other advanced computing applications will be conducted in the U.S., (5) be home to multiple high-volume advanced packaging facilities, (6) be a global
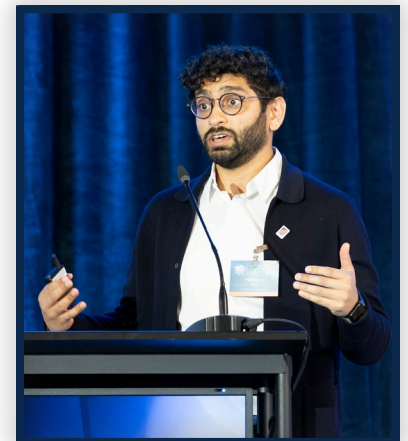
leader in commercial-scale advanced technology, (7) have strategically increased production capacity for current-gen and mature chips, and (8) chipmakers will also be able to respond more nimbly to supply and demand shocks.

- The CHIPS workforce calls for the doubling of the U.S. semiconductor workforce overall, tripling the number of graduates in semiconductor-related fields, including engineering, training 100,000 new technicians through apprenticeships, career and technical education and career pathways programs, expanding recruitment for more people from underserved communities to launch semiconductor industry careers and hiring and training an additional million women in construction to meet the demand across a range of industries.

- Taking our STEM ideas to the commercialized market takes too long.

OPPORTUNITIES:

- Comparatively speaking, operational costs in the U.S. are lower than our global counterparts.

- We need to be smarter about what we require as we move people through the STEM funnel, removing barriers will increase throughput.

- The CHIPS National Semiconductor Technology Center, a public-private consortium, is leading the creation of Workforce Centers of Excellence with a focus on (1) convening industry, research, education, government, and labor stakeholders; (2) collecting data to measure the success of existing programs and guide future investment; (3) scaling up proven programs; and (4) piloting new efforts, including initiatives to engage underserved communities.

- This is a long game: the CHIPS for America program will push us to be employer-driven and community-guided. With passion and entrepreneurial spirit, we can inspire our nation back to the top. For more information: CHIPS for America | NIST

MARCH 3-4, 2025

ORAU

2025 Annual Meeting of the ORAU Council of Sponsoring Institutions
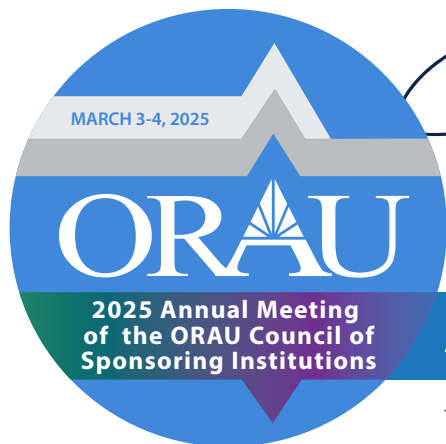
Save the Date

MARCH 3-4, 2025

Advanced Manufacturing: Industry 4.0

Tentatively include: clean energy manufacturing, supply chain challenges and redefining manufacturing jobs.

The focus will zero in on how we capitalize on manufacturing USA Institutes and newly-funded Economic Development Administration Tech Hubs such as pharmaceuticals, aerospace materials, forest bioproducts, biologics, cyber security and emerging technologies.