Virginia Science, Technology, Engineering and Mathematics (STEM) Commission:

How STEMx Challenge Grant helped us collect voices and perspectives across the Commonwealth

A brief history

Virginia has started an official STEM Education Commission initiated by Governor Northam's Executive Order # 36 signed July 17th, 2019. This Executive Order was the state's first formalized effort to pull together 44 stakeholders from across the Commonwealth. The stakeholders represented each region of Virginia as well as embodied various sectors, or business/education interests, to ensure that we are pulling from a broad set of perspectives for this Commission.

Developing a State STEM Plan is ultimately the intent of the Executive Order. Excerpt:

The Virginia STEM Education Commission shall work to develop a State STEM Plan to include a set of definitions, goals, strategies, and measurable impacts and outcomes related to the following key areas:

1. Inspire and empower our students to develop the knowledge, skills, and mindsets necessary to thrive in a rapidly changing, technologically advanced, global society.
2. Ensure equitable opportunities and access for every Virginian to become a vital part of a robust STEM ecosystem.
3. Continuously improve the awareness, effectiveness, support, and quality of partnerships among educational entities, employers, and nonprofits.
4. Create sustainable and supportive conditions to align Virginia's educational, economic, and community goals.

Virginia Science, Technology, Engineering, and Math (STEM) Education Commission

- **Blair Blanchette** of Richmond, *Outdoor Field Educator, Chesapeake Bay Foundation*
- **Dr. Al Byers** of Chesterfield, *Visiting Scholar for STEM Education, Virginia Commonwealth University*
- **Dr. Jared A. Cotton** of Chesapeake, *Superintendent, Chesapeake Public Schools*
- **Marie T. Culver** of Virginia Beach, *Gifted Resource Teacher, Virginia Beach City Public Schools*
- **Rebecca Dovi** of *Henrico County, Director of Education, CodeVA*
- **Charles English** of Midlothian, *Virginia STEM Coordinator, Science Museum of Virginia*
- **Dr. David Eshelman** of Midlothian, *Director, Workforce Development and Initiatives, Virginia Department of Education*

- **Todd Estes** of Williamsburg, *Director, Career Education Programs and Workforce Partnerships, Virginia Community College System*
- **Jocelyn Forest** of Halifax County, *Educator, Halifax County High School*
- **Megan Graybill** of Salem, *Computer Science Teacher, Salem City Schools*
- **The Honorable Megan Healy** of Richmond, *Chief Workforce Development Advisor to the Governor, Commonwealth of Virginia*
- **Dr. David C. Jeck** of Marshall, *Superintendent, Fauquier County Public Schools*
- **Barbara Kanninen** of Arlington, *School Board Member, Arlington Public Schools*
- **Matt Kellam** of Henrico, *Military and Recruitment Program Coordinator, Dominion Energy*
- **Bobbie Greene Kilberg** of McLean, *President, and CEO, Northern Virginia Technology Council (NVTC)*
- **Helen W. Kuhns** of Virginia Beach, *Assistant Director and Pearl Programs Coordinator, Lynnhaven River Now, and Executive Board Member, Virginia Association for Environmental Education*
- **Dr. Pamela Leigh-Mack** of Chester, *Professor and Chair, Department of Engineering and Computer Science, Virginia State University*
- **Louie R. Lopez** of Bel Air, Maryland, *Director, STEM Education and Outreach, United States Department of Defense*
- **Dr. Emily Loving** of Chesterfield, *Lead STEM, and Secondary Science Specialist, Chesterfield County Public Schools*
- **Dr. Susan Magliaro** of Christiansburg, *Professor Emerita, Virginia Tech*
- **Dr. Tina Manglicmot** of Newport News, *Director of STEM and Innovation, Virginia Department of Education*
- **Kate Matthew** of Charlottesville, *Senior Research Specialist, University of Virginia*
- **Margaret Mayer** of Glen Allen, *Managing Vice President – Technology, Capital One*
- **Dr. James A. Meyer** of Spotsylvania, *Representative, Virginia School Boards Association*
- **Pamela Northam** of Richmond, *Former Science Educator, First Lady of Virginia*
- **Dr. Keisha Pexton** of Hampton, *Director of Learning and Workforce Development, Newport News Shipbuilding and Member, Virginia Board of Education*
- **Angela Patton** of Chesterfield*, Founder, Camp Diva and CEO, Girls For A Change*
- **James Pohl** of Virginia Beach, *Chief Academic Officer, Newport News Public Schools*
- **Dr. Tinell L. Priddy** of Leesburg, *Principal, The Academies of Loudoun, Loudoun County Public Schools*
- **The Honorable Atif Qarni** of Prince William, *Secretary of Education, Commonwealth of Virginia*
- **Casey M. Roberts** of Chesapeake, *Executive Director, New Horizons Regional Education Centers*
- **Eric Robertson** of Minneapolis, *Minnesota, Global Education, Amazon Web Services (AWS)*
- **Paula Fisher Robinson** of Newport News*, Assistant Director of College Access and PK12 Outreach, State Council of Higher Education for Virginia (SCHEV)*
- **Krystal Rubio** of Colonial Heights, *Student, CodeRVA Regional High School*
- **Amy Sabarre** of Rockingham County, *Director of STEM Education, Harrisonburg City Public Schools*
- **Kamaljeet Sanghera** of Fairfax, *Executive Director of STEM Outreach, Volgenau School of Engineering at George Mason University*
- **Dr. Matthew W. Shields** of Charlottesville, *Teacher, Charlottesville City Schools*

- **Troy Simpson** of Chatham, *Director of Advanced Manufacturing, Institute for Advanced Learning and Research*
- **Zuzana Steen** of Manassas, *Academic and Community Relations Manager, Micron Technology, Inc.*
- **Lily Toombs** of Charlotte County, *Student, Virginia Council on Women's 2019 STEM Essay Contest award recipient*
- **Clayton Turner** of Hampton, *Deputy Director, NASA Langley Research Center*
- **Jorge Valenzuela** of North Chesterfield*, Educational Coach, and Teacher, Lifelong Learning Defined and Old Dominion University*
- **Amy Stinnett White, MS** of Buchanan, *Dean, School of STEM, Virginia Western Community College*
- **Elizabeth (Beth) Wright** of Abingdon, *Associate Professor of Nursing, Virginia Highlands Community College*

First Lady of Virginia, Pamela Northam, leads the STEM Education Commission and is supported by the Secretary of Education, Atif Qarni as well as the Virginia Department of Education, Dr. Tina Manglicmot, and the Science Museum of Virginia, Chuck English.

The Commission held its first meeting in August 2019, followed up by several in-person conferences that focused on developing some common language, goals, vision, and mission. The Commission gatherings included a larger statewide stakeholder meeting, Virginia's first STEM Summit at Virginia Commonwealth University, which included speakers such as Dr. Jeff Weld and Astronaut Leland Melvin.

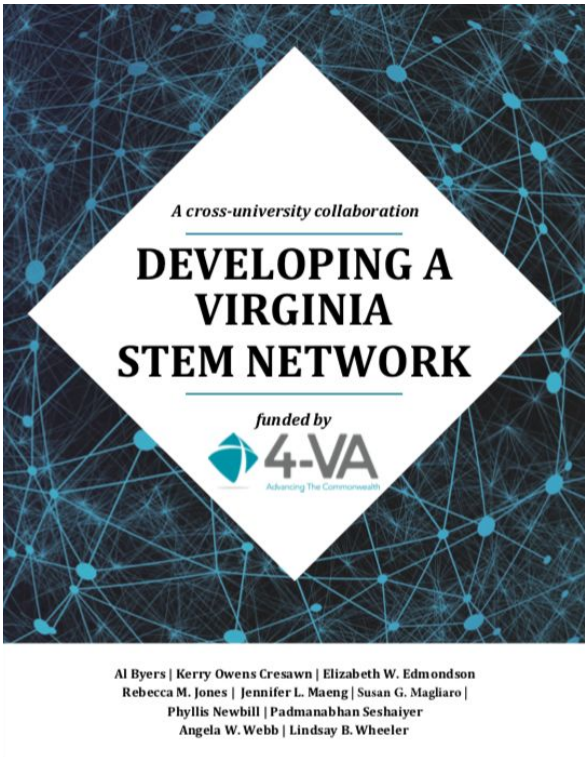

Image left: This Summit culminated in a 4-VA STEM network Whitepaper with recommendations to the STEM Commission.

By the time the STEM Education Commission met these initial goals, we had started to gather virtually as a result of COVID-19 closures and travel restrictions. The original Executive Order and plan included the development, drafting, and submission of a State STEM Plan by the end of June 2020. Outside factors, especially COVID-19 delays, has moved the timeline back, resulting in a State STEM Plan that will be due towards the end of August. As a result, the culminating impact of our STEMx Challenge grant, our state STEM plan, will not be finalized by the time this report is due. This report will focus on the efforts and the work of the STEM Commission regarding the STEMx Challenge grant focus of ensuring that we collect the voices and perspectives of rural Virginians. This

audience may not feel as if they had influence and impact on the work designed to lift the entire state's efforts within STEM.

The Secretary of Education's website includes work and notes from the State STEM Education Commission meetings and from the sub-committees, some of which used some of the research garnered through the STEMx Challenge grant. Virginia's STEM Education Commission has, since receiving the Challenge grant, developed a vision and mission; however, the first time we want to publish that information formally will be when we submit the STEM Plan to the Governor for approval. The Secretary's website hosts some of the current documents and works, including drafts of the vision and mission.

Rural Initiative **STEMx Challenge Grant supported initiative**

The STEMx Challenge Grant provided a fantastic opportunity for Virginia to expand upon the collective set of voices on the STEM Education Commission to include individuals from across Virginia and not represented on the commission. Virginia STEM took advantage of the STEMx funding to create a tour through rural Virginia to talk with communities and various stakeholders regarding STEM. These tour stops included sharing with participants the STEM Commission work and some of the initial thinking and processes involved. The meetings focused on listening to the participants share their thoughts, ideas, and concerns regarding STEM. We also discussed STEM impacts within their communities, what counts as STEM, and if there are leaders or icons for the community to tie their STEM efforts to create regional relevance. Both Dr. Tina Manglicmot and I facilitated these conversations.

The dialogue included much discussion on a common language, including STEM vs. STEAM, etc. The gatherings then proposed a lot of the work the STEM Commission started. We made sure that we also broke every 10-15 minutes for questions and to listen to the audience after asking the following:

1. What does STEM include? Or exclude?
    - Some example answers (include): authentic, application, transferrable, integration, innovation, all students
    - Some example answers (exclude): rigid procedures, regurgitation, tyranny of the disciplines, single solutions, craft activities (if not elevated)
2. What do we envision for STEM/STEM Education in 5 years if we got everything we wanted. What would be an end goal for a State STEM Plan?
    - Some example answers: ongoing PD, full integration, equitable access, better career pathways, literacy for all (not just students), solving real-world problems, community involvement
3. Are there impediments we should be aware of and address in the State STEM Plan? Can we identify potential solutions to these proposed concerns/issues?
    - Some example answers: initiative fatigue, equity in resources, lack of exposure, transportation, local/regional access, teacher prep, funding

4. The gatherings ended by asking for models of STEM success in the area, pitfalls to avoid, and if there were any businesses or people that are STEM champions in the area.
    - Some example answers: CTE inclusion/integration with STEM, various groups – which was not apparent to everyone present and opened a dialogue about a 'landscape study' of opportunities and potential collaborations.
5. We usually followed up afterward, asking if other stakeholders should be part of this dialogue. It also ensured that we built up a list-serve of contacts we can reach for when the state has an approved STEM Plan.

We made sure we asked all of the same questions in each region, to see if there were rural trends within the various areas that need inclusion into the STEM Plan. The results were not unlike some of the results we encountered within our STEM Commission group, but it did highlight some areas that we may need to focus on within our document. Many of the districts felt constrained as a result of a lack of resources. The resources could include local museums, interested business partners, afterschool programming, and the funding formulas restricting their growth in new areas such as STEM for all.

Transportation was a more significant issue than we expected, and it prevents many youths from participating in events afterschool or in the community. The rural areas covered an enormous footprint, and many children lacked access as they would in areas with more financial support for bussing or public transportation. This issue had separately come up when we spoke with Virginia Commission on Work-Based learning, that many youths cannot participate as interns due to transportation or as a result of unpaid internships, which prevented the capacity to help offset transportation costs. Another issue common within these regions, but not tied directly to the questions we asked were concerns around broadband access. Follow-up emails after COVID closures began to highlight internet access as a significant issue. Lack of broadband limits access to tools, resources, and in some cases, even healthcare or telecommuting options. A quick follow up on broadband access was the training necessary to create effective and efficient programming options online, especially for households that are not used to using broadband access.

STEM-hubs also came out of the discussions; however, they were brought up by all interested STEM stakeholders. The intent of the STEM hubs may have changed a little, depending on the region. Rural areas identified regional centers as a way to maintain their own identity and hopefully keep youth from leaving the area, which has been recognized not as a brain drain as much as a talent or skills drain from these less populated regions. The hubs would serve multiple purposes, and the rural areas see them as ways to work with like-minded, supportive communities, and partners ensuring that they can promote the possibilities of a STEM future within their region.

Both Dr. Manglicmot and I held five rural STEM Gatherings before we had to cancel some of our scheduled meetings due to COVID closures and travel restrictions. These areas include: Roanoke, Abingdon, Danville, Warsaw, and Dahlgren. We met at community colleges, higher education centers, museums, and conference venues. It was a right mix pulling 15-120

attendees at a meeting. Most seemed tied to education; however, there were local businesses, interested parents, and some political people at the gatherings as well.

The invitations that went out to the communities and shared by numerous partners in the area included inviting text:

> *Chuck English, State STEM Coordinator, here. I'm working with the Virginia Department of Education STEM Director, Dr. Tina Manglicmot, and the Governor's STEM Commission to create Virginia's first STEM Plan. This coordinated guiding document will ensure our Commonwealth continues to be a leader in science, technology, engineering, and math.*
>
> *Dr. Manglicmot and I are coming to your area and would like your input. Please join us for information-gathering, resource sharing, networking, and food!*
>
> *This gathering is for educators (PK-12 through postsecondary), community members (museums, community centers, and after school youth programs) and businesses (all are welcome, not just those in the STEM field). We would like your feedback about the Governor's STEM Commission, STEM vs. STEAM, STEM definitions, and examples of quality STEM programming.*
>
> *We would also like to start a dialogue about the state's progress in STEM planning to meet the needs of the Commonwealth. Collecting your perspectives on what STEM initiatives would help your region and what potential impediments we should acknowledge in our planning will be invaluable to the process. Your insight will impact how we write Virginia's STEM Plan and ensure it will be helpful for all regions and residents of the Commonwealth.*

Both Dr. Manglicmot and I also shared similar information at other education-focused gatherings where we had opportunities to present. These events included various community and state organizations and educational professional organizations (i.e., Virginia Math Science Coalition, Virginia Association of Science Teachers, Virginia Resource Use Education Committee) and a few conferences including the Virginia Children's Engineering Conference, Association of General Contractors of Virginia, Virginia Environmental Education Association and the James Madison University STEM PD Day. Unfortunately, we had to cancel nearly a half dozen additional gatherings due to COVID closures and travel restrictions. Our communications have since become more virtual but included a myriad of partners that may otherwise not have opportunities to share their thoughts and ideas. It allowed for dialogue for a more comfortable settling of standard terms and language, a consistent issue identified through our tour and talks regarding STEM.

Next Steps

The STEM Education Commission has continued to meet and keep their momentum moving forward. Virtual meetings resume ensuring that we continue our charge, albeit with an altered timeline from expectations listed in our STEMx Challenge grant timeline. After COVID closures, the Commission created four sub-committees to help research and write sections for the full STEM Plan. The sub-committees included STEM Literacy, Equity, Inclusion & Access, Workforce Pipeline, and Creating Sustainable Partnerships. The four separate groups worked over many weeks and through a multitude of smaller meetings to create four informative reports that will help identify significant problems, potential solutions, action steps, and even measures for success. The reports include a lot of recent research, including best practices as well as a clear pathway that helps avoid some of the pitfalls other states and organizations have come across. Some of the work created opportunities to invite in content experts to help the sub-committees in their writing and research. The full STEM Education Commission pulled together these efforts in a full STEM Commission meeting, presenting before the Secretary of Education as well as the First Lady. Upon the writing of this report, the sub-committees were finalizing their efforts, and the commission started aligning the language for the full STEM Plan draft.

The sub-committee reports can be found in the Dropbox on the Secretary of Education's STEM website.

The original timeline was to have the report in the Governor's hands in June; however, COVID impacts slowed down some of the efforts, and the final plan submission to the Governor's Office is in late August.

Despite a slowing of our original timeline, Virginia STEM has continued efforts to communicate their work and to collect voices from around the state. Virtual meetings continue, professional organizations are now calling in Virginia STEM to ensure appropriate language and terms are used and understood. Virginia STEM leadership has continued to work moving STEM forward as well as combining these efforts with many additional initiatives over the last several months. Since we received the STEMx funding, both Dr. Tina Manglicmot and Chuck English were interviewed for the STEMx Scoop. Both have worked on Virtual Virginia structure, access, and programming, open educational resources (GoOpenVA), programming with partners from libraries, state parks to parents looking for things to do in their own homes with children of all ages. For the first time, K-8 STEM lessons were created and embedded in Virtual Virginia online content to support the Continuity for Learning and made available to all educators across the state. Virginia STEM's current challenge includes dovetailing the myriad of efforts with the intent of the work and with integrity. It is not hard, but it takes time. These challenges are a result of a shift in our educational culture; we are identifying ways in which STEM can truly impact all education and all students - which was part of the messaging we were receiving from communities that already identify with that. Communities that recognize that STEM is more than 4-year degrees, more than computer science, but rather embraces the agricultural, general contractor, shipbuilding, manufacturing communities as well. It is an opportunity to let

youth know that there is productive and meaningful work in STEM within their home communities.

Virginia STEM is moving forward as a leader within a season of change. Even though the change is the result of tragic events over the last four months, these changes have created opportunities to re-evaluate our institutional patterns and see if there are more effective, efficient, and equitable ways to provide education, especially STEM Education. The STEMx Challenge Grant has helped us put a new lens on our thinking, helping us focus on audiences that do not feel as if their voice is heard, their message recognized. The remnant of funds not expended by the expected timeline supported dialogue through virtual meetings, communications, reporting, and ensuring that we continued our efforts to meet the same ends - that the Virginia STEM Plan is for all Virginians.

Acknowledgements

Support for the Virginia STEM Commission and its work to develop a State STEM Plan includes partnerships and funding from STEMx/Battelle, and state partners such as the Science Museum of Virginia, 4-VA STEM program, Virginia's Secretary of Education and the First Lady's Office. Host locations for meetings include James Madison University, Virginia Commonwealth University, the Chesapeake Bay Foundation's Brock Environmental Center. The STEMx Rural Tour meetings were supported by the Southwestern Virginia Center for Higher Education, the Danville Science Center, the University of Mary Washington Dahlgren Campus and Rappahannock Community College Warsaw Campus. The writing for the STEM Plan is being supported by the STEM Commission members listed above.

For additional information please feel free to contact:

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