



## **Path to A Brighter Future: Making Virginia the Best State in the Nation for STEM-H and Computer Science Education**

STEM-H and computer-science related fields are constantly evolving and changing the world we live in, and they are driving the economy. In the near future, almost every occupation will require some degree of STEM-H or computer literacy.<sup>1</sup> The future of Virginia's economy depends on ensuring our students are educated and trained in these high-paying, high-demand fields, our workforce is ready to support the demand for these jobs, and our Commonwealth is attracting and creating a strong supply of the new jobs and new employees of today. By investing in STEM-H and computer science education, we can create economic opportunity, work to level the playing field, and create pathways to good paying jobs in a growing sector for all Virginia children.

Virginia is currently one of the top five states in the nation for STEM jobs, and it is time that we become the best in the nation for producing highly-skilled and highly-qualified workers to fill those jobs.<sup>2</sup> Research indicates that locations in the United States with more STEM-oriented economies have less income inequality and benefit from higher rates of job growth, employment, wages, and exports. Terry has long acknowledged the importance of fostering education and training in these fast growing and highly technical fields. As Virginia's 72nd governor, he set an aggressive goal to graduate more than 50,000 Virginians each year from training programs in STEM-H fields -- a goal that Virginia exceeded. Terry knows that these STEM-H jobs increasingly offer incredible opportunities to people who earn post-secondary certificates or associate's degrees<sup>3</sup> In other words, a four-year degree no longer stands in the way of success in a high-paying job or even an opportunity to advance

Not only are STEM-H and computer science jobs high paying, the demand for workers in these fields exceeds the supply of qualified professionals for these roles. Over 80 percent of the fastest-

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<sup>1</sup>Van Eerd, Robbert, and Jean Guo. "Jobs Will Be Very Different in 10 Years. Here's How to Prepare." World Economic Forum, 17 Jan. 2020, [www.weforum.org/agenda/2020/01/future-of-work/](http://www.weforum.org/agenda/2020/01/future-of-work/).

<sup>2</sup>"STEM Opportunity Index." STEM Opportunity Index | NMS.org, [www.stemopportunityindex.com/](http://www.stemopportunityindex.com/).

<sup>3</sup>Rothwell, Jonathan. "The Hidden STEM Economy." Brookings, Brookings, 4 Oct. 2016, [www.brookings.edu/research/the-hidden-stem-economy/](http://www.brookings.edu/research/the-hidden-stem-economy/).

growing occupations require significant mathematics and science preparation,<sup>4</sup> but there is a shortage of workers in Virginia that have the necessary skills for these positions. Only 21% of Virginia high school students are interested in STEM majors or careers, which means that our schools are failing to emphasize the revolutionary future of STEM-H and falling short in their charge to effectively teach students these subjects.<sup>5</sup> As governor, Terry signed the first law in the United States that made computer science education mandatory for all Virginia students K-12. This is a great start, but Terry realizes that this issue is broader than just reforming the curriculum; it's about better coordinating resources and then offering more of those resources to individuals, especially to those in underfunded communities.

Virginia's education system, unfortunately, was built for the industrial revolution and is in dire need of transformation. We must continue Virginia's shift toward embedding Science, Technology, Engineering, Mathematics, Healthcare (STEM-H) and computer science and computational thinking (CS & CT) literacy into the fabric of our curricula; create an equitable foundation for all of Virginia's students to access and succeed in these fields; and engage with business and employers to train and support the workforce of the 21st Century. As Virginia's next governor, Terry will work to make Virginia the best state in the nation for STEM-H and computer science education.

As Virginia's next governor, Terry will address this employment shortage at the root by tackling the equity and access gaps head-on that have prevented too many students, particularly young women and students of color, from cultivating interest in these fields and realizing their STEM-H identities. He will work to transform our education system, focusing on student-centered and inquiry-based learning that will create STEM-H, CS & CT literate students. Finally, Terry will leverage strong relationships with the private sector to invest in the workforce of the future and create opportunities for all Virginia students. His administration will develop a comprehensive STEM-H Workforce Development Plan and partner with K-12 leaders, institutions of higher education and private sector partners to create equitable access to opportunities and align our education system with the needs of the workforce. Terry is ready to get to work for Virginians.

### **Build an Equitable Foundation of Access to Knowledge, Skills and Resources**

Terry knows that it wouldn't be right to talk about advancements in STEM and computer science learning without addressing the inequalities that take place in these fields. We know that only 9 percent of girls between the ages 13-17 are interested in STEM careers and that only 16 percent of STEM workers are Black or Hispanic.<sup>6</sup> Terry wants to build an education system that gives all Virginians access to the resources they need, and that actively encourages underrepresented

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<sup>4</sup>"Fastest Growing Occupations : Occupational Outlook Handbook." U.S. Bureau of Labor Statistics, U.S. Bureau of Labor Statistics, 1 Sept. 2020, [www.bls.gov/ooh/fastest-growing.htm](http://www.bls.gov/ooh/fastest-growing.htm). and

"STEM and US Job Market." Office of the Provost & Executive Vice Chancellor – STEM Strategies, [stem.ucdavis.edu/stem-and-us-job-market/](http://stem.ucdavis.edu/stem-and-us-job-market/).

<sup>5</sup>"STEM Opportunity Index." STEM Opportunity Index | NMS.org, [www.stemopportunityindex.com/](http://www.stemopportunityindex.com/).

<sup>6</sup>Rose, Ashley. "Female Interest in STEM Education and Careers Decreasing." Government Technology State & Local Articles - E.Republic, 3 June 2019, [www.govtech.com/education/Female-Interest-in-STEM-Education-and-Careers-Decreasing.html](http://www.govtech.com/education/Female-Interest-in-STEM-Education-and-Careers-Decreasing.html). and Funk, Cary, and Kim Parker. "Diversity in the STEM Workforce Varies Widely across Jobs." Pew Research Center's Social & Demographic Trends Project, 31 Dec. 2019, [www.pewsocialtrends.org/2018/01/09/diversity-in-the-stem-workforce-varies-widely-across-jobs/](http://www.pewsocialtrends.org/2018/01/09/diversity-in-the-stem-workforce-varies-widely-across-jobs/).

groups to pursue STEM-H and computer science careers. No student should be held back from learning because of socioeconomic status, language barriers, societal pressures, or lack of school funding. Terry's plan will:

- **Address the digital equity gap.** In order to truly promote STEM-H, CS & CT literacy, we have to address the digital equity gap that has been exacerbated by the COVID-19 pandemic. Terry's [education plan](#) will get every student online, but access to broadband is not the only challenge Virginia families are facing. The COVID-19 pandemic has laid bare the inequities that have existed in our system for too long, and demonstrated that we must go further and ensure that students have access to computing devices in their homes. Without access to computing devices and other essential technologies, students are unable to participate in virtual learning, complete school work or develop essential technology skills. Terry will work with local school divisions to assess needs and create a program that will connect students with the educational technologies they need to succeed. Further, Terry will work with school divisions to gain stronger purchasing power with vendors so that smaller divisions can benefit from consortia-level acquisitions of technologies and reduce costs.
- **Build STEM-H, CS & CT literacy into educator curricula and increase diversity.** Terry recognizes that preparing our students with the STEM-H, CS & CT skills they need to step into jobs of the future requires a highly-competent, diverse educator workforce that can teach these critical skills and engage students of all backgrounds. Unfortunately, Virginia continues to face critical shortages in STEM-H and computer science educators and our educator workforce does not reflect the diversity in our Commonwealth. That is why his bold education plan will build the next generation of educators through his [Lucy Simms Educator Program](#), with a specific focus on diverse communities and partnerships with Historically Black Colleges and Universities. Terry also recognizes that building a literate generation of learners in these fields and improving accessibility and inclusion requires that we revamp curricula for educators so that these principles are embedded in their coursework regardless of the subject or grade level they will be working in. As governor, Terry will work with the Virginia Department of Education (VDOE), the State Council on Higher Education of Virginia, educator preparation stakeholders and our community college system to revamp existing curricula to meet this need.
- **Invest in STEM-H and computer science-specific professional development opportunities for educators with a focus on equity and inclusion.** In addition to modernizing curricula for new educators, we must build capacity within our existing educator workforce and ensure educators are well-equipped to cultivate STEM-H and CS interest in students of all backgrounds. Too often, young women and students of color fail to see their STEM-H or computer science potential, which has created serious diversity issues in these fields. We must equip our educators with the knowledge and skills they need to understand and teach these principles, but also to combat access and inclusion issues so we can successfully drive young women and students of color toward these career paths. Terry will vastly increase professional development opportunities for educators that improve their ability to teach these principles, but also to help every student realize their STEM-H and computer science potential.

- **Fund additional supplemental STEM-H and computer science programs in underserved communities for students of all ages.** As we prepare students to take on jobs of the future, we have to ensure that students of all ages become STEM-H, CS & CT literate so they are prepared with the appropriate skills for success. Because we have shortages not only in these job markets, but also lack educators to teach in these fields, we must accelerate participation in out-of-school education programs. It is a fact that these fields dramatically lack diversity, in part because they lose young women and students of color early in the educational process. In order to improve diversity in these fields, we must intentionally engage diverse students early and often. As Virginia’s 72nd Governor, Terry created grant programs for summer cybersecurity camps.<sup>7</sup> Providing supplemental programs, after-school or summer, whether virtual or in-person to enable students of all backgrounds to naturally develop literacy in these areas, see themselves as successful learners and accelerate entry into these fields. This effort will not only set students up for success, but it will also spur economic growth and establish Virginia as a leader for these industries. As our next governor, Terry will make additional funding available for school divisions to provide summer STEM-H and computer science programs with a specific focus on diversity, equity and inclusion.
- **Expand and create a systemic approach to deliver informal, culturally competent educational campaigns about STEM-H, CS & CT.** If we are truly going to reach children of all ages and backgrounds, and cultivate an interest in STEM-H, CS & CT, we have to meet students where they are and create a systemic approach enabling them to learn in different settings. Young learners obtain a great deal of knowledge about science in out-of-school, or informal settings,<sup>8</sup> meaning that we have to take advantage of opportunities to introduce children and students of all ages to STEM-H, CS & CT concepts through early childhood programs, after-school or summer programs, and in unique community settings. These informal learning opportunities must also be culturally competent and available in a learner’s language. Too often, students of color or young girls shy away from these pathways because we have failed to help them develop their STEM-H or computer science identities. Preparing materials with diversity and cultural competency in mind and meeting our students where they are will help to develop a STEM-H, CS & CT literate citizenry. Terry will work with VDOE and other education stakeholders to grow our existing offerings and develop a statewide framework for delivery.

### **Modernize Virginia’s Education System to Equip Students with the STEM-H, CS & CT Knowledge and Skills they Need to Succeed**

Cultivating a highly-qualified, STEM-H, CS & CT literate workforce of the future will require a paradigm shift in the way we educate our students. We must adopt a student-centered approach,

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<sup>7</sup>Newsome, Cherise. “Gov. Terry McAuliffe Visits Cybersecurity Camp in Portsmouth.” Pilotonline.com, The Virginian-Pilot, 3 Aug. 2019, [www.pilotonline.com/news/education/article\\_a178e59b-fc97-597d-9c1d-4ba506920a5b.html](http://www.pilotonline.com/news/education/article_a178e59b-fc97-597d-9c1d-4ba506920a5b.html).

<sup>8</sup>Guillory, Ferrel, and John Quinterno. Strategies That Engage Minds: Empowering North Carolina’s Economic Future, North Carolina Science, Mathematics, and Technology Education Center, 2013. [www.ncstemcenter.org/wp-content/uploads/2014/03/NCSTEMScorecard.pdf](http://www.ncstemcenter.org/wp-content/uploads/2014/03/NCSTEMScorecard.pdf).

challenge our students from a young age to be active participants in the learning process, explore and inquire about the world from a scientific perspective, and incorporate hands-on, applied learning opportunities to build competency. As Virginia's 72nd Governor, Terry ensured that Virginia became the first state in the nation mandating that every student would receive computer science and computational thinking literacy instruction beginning in Kindergarten.<sup>9</sup> and now we must ensure that every student is STEM-H, CS & CT literate upon graduation. Terry's plan will:

- **Create a statewide Center of Excellence for K-12 Computer Science and Data Analytics Education.** Virginia's K-12 computer science initiative is a national model for supporting K-12 computer science and computational thinking literacy. Leveraging small amounts of direct state funding, corporate and foundation investment, and federal research grant funding, Virginia has brought in millions in investments for K-12 computer science initiatives in the past decade. Last year, more than 1,000 teachers were trained statewide at all grade levels, joining thousands more that have been trained in recent years. While these efforts have produced tremendous results in the Commonwealth, it is critical that we create a centralized Center of Excellence that can consolidate statewide resources and training opportunities, and also leverage additional private investments. Terry will establish a Center to foster strong collaboration between K-12, state higher education and other education partners to better coordinate resources, facilitate an equitable rollout of computer science and computational thinking literacy and set every child up for success.
- **Integrate STEM-H, CS & CT literacy into curricula across subjects and grade levels, and incorporate inquiry-based assessments.** Taking individual STEM-H-related courses or viewing STEM-H and CS as "separate" subject areas will not be sufficient to create a STEM-H, CS & CT literate workforce. STEM-H principles must be embedded across subjects and grade levels so that our students are learning to explore the world through the scientific method, and with a computational approach to problem-solving. Terry also recognizes the importance of modernizing assessments to truly measure proficiency and mastery in a subject area rather than simply determining which students are best equipped to take a test. Terry will ensure that Virginia's curricula are updated and that students have the ability to demonstrate their mastery of a subject not only through rote memorization, but through applied, inquiry-based assessments.
- **Identify schools in need of additional STEM-H and CS supports and provide resources and technical assistance.** Terry's bold [education plan](#) calls for the creation of an Education Equity and Innovation Commission and Fund that will root out inequities and drive innovation in our school divisions. We know that ensuring that every student has access to a world-class, equitable education means having access to rigorous

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<sup>9</sup>Sawchuk, Stephen. "Virginia Becomes First State to Require Computer Science Instruction." Education Week, Education Week, 20 Nov. 2020, [www.edweek.org/teaching-learning/virginia-becomes-first-state-to-require-computer-science-instruction/2017/11#:~:text=Virginia%20Becomes%20First%20State%20to%20Require%20Computer%20Science%20Instruction,-By%20Stephen%20Sawchuk&text=In%202016%2C%20Virginia%20lawmakers%20made,thinking%2C%20including%20computer%20coding.%E2%80%9D](http://www.edweek.org/teaching-learning/virginia-becomes-first-state-to-require-computer-science-instruction/2017/11#:~:text=Virginia%20Becomes%20First%20State%20to%20Require%20Computer%20Science%20Instruction,-By%20Stephen%20Sawchuk&text=In%202016%2C%20Virginia%20lawmakers%20made,thinking%2C%20including%20computer%20coding.%E2%80%9D).

coursework and cutting-edge technologies. It also means helping every student to realize their potential and support them on their pathways to the workforce. That is why Terry will task the Commission with evaluating STEM-H learning and identifying STEM-challenged schools or divisions that need additional technical support or resources. These schools will have the ability to apply for grants through the Education Equity and Innovation Fund to address these issues and improve STEM-H education.

- **Create additional opportunities for students to obtain credentials or college credits in high school.** Helping our students to see their STEM-H and CS potential, and step into jobs of the future means that in addition to shifting our education paradigm, we have to offer more opportunities for high school students to obtain hands-on experience, relevant industry credentials and college credits. While some students intend to seek a four-year degree at a college or university, more and more STEM-H, CS and cybersecurity jobs are available to individuals who would prefer to seek an industry credential instead. As Virginia's 72nd Governor, Terry transformed the high school experience with a focus on workforce readiness. As our next governor, Terry will partner with industry leaders, our community college system and institutions of higher education to increase opportunities for students and enable more students to graduate and step right into a good job or transition smoothly into the next step in their educational journeys.
- **Create a STEM-H, CS & CT Scorecard.** Becoming the best state in the nation for STEM-H, CS & CT education and workforce readiness are not just about how many students can pass a test. Building a STEM-H, CS & CT literate citizenry will require a new vision of success and finding meaningful ways to measure our progress as a Commonwealth. In addition to tracking coursework, we also must ensure that we are cultivating interest for a diverse group of students, providing meaningful, hands-on learning opportunities, building clear pathways to the workforce and meeting the demands of these industries. Terry will work with education and industry professionals to identify key metrics, track our progress by school division and as a Commonwealth and ultimately enable Virginia to become the best state in the nation for STEM-H education.

### **Cultivate Public-Private Partnerships to Advance STEM-H, CS & CT Literacy, Build the Workforce of the Future, and Attract High-Paying Jobs**

STEM-H and computer science are the industries of the future, and private sector industries are in dire need of highly-skilled workers to fill their increasingly technical jobs. The future of our economy depends on our ability to transform our education system and build a pipeline of highly-skilled workers in every corner of the Commonwealth, especially in our rural communities. Terry recognizes that private sector industries can play an integral role in preparing our workforce and helping every student see their STEM-H potential. As governor, he will leverage his strong relationships with the private sector to build a pipeline of highly-skilled workers that will fill existing jobs and attract new, high-paying jobs to the Commonwealth. Terry's plan will:

- **Establish regional Technology Innovation Labs (TIL) and impact teams.** Technology is evolving more rapidly than ever, and schools cannot keep pace with changes in technology and the rapid digitalization of schooling. Today, there is not a single resource

area for local school divisions to test and pilot new concepts and ideas that technology allows schools to do differently. These regional TILs can fill this gap, and will serve as a nexus where private sector EdTechs, school divisions, teachers, and the VDOE can cross-pollinate ideas, validate through testing, and scale for statewide use. The TIL will also convene impact teams that can set and measure regional goals surrounding workforce and economic development expansion to move their region forward. TILs and impact teams will partner with school divisions, teachers, communities and technology leaders to identify the problems and questions which need to be addressed, develop solutions, test the ideas as viable or not, evaluate and improve the solution output. These labs also provide a mechanism for local communities to provide input where innovative solutions could then scale to other districts with similar challenges. Terry is well-equipped to establish these TILs and will do so as Virginia's next governor.

- **Build STEM-H, CS & CT capacity and business in rural communities.** When looking for opportunities to build or grow, businesses are concerned not only about having access to a qualified workforce, but also locating in areas where employees and their families can flourish, with good quality of life. That means access to good schools, strong infrastructure and affordable housing. Virginia's rural communities and small towns are rich with opportunity and are ripe for STEM-H and computer science development. Terry is committed to getting every student online during his administration and transforming our education system to produce STEM-H, CS & CT literate students that are ready to step into these jobs. As governor, Terry will highlight the rich opportunities in Virginia's rural communities and small towns, attracting high-paying jobs and industries to these areas of the Commonwealth.
- **Leverage the Commonwealth's procurement process to secure training and educational opportunities.** Each year, the Commonwealth enters into contracts with many private sector companies for the provision of goods or services, creating ample opportunities to leverage their expertise to educate Virginia's students or employees about their industry. As Virginia's next governor, Terry will work with our procurement office to incorporate training, internship and apprenticeship opportunities into the bidding process. Private sector partners benefit from having a well-trained and highly qualified workforce, and providing learning opportunities will benefit the long-term growth of these industries. This will also help to strengthen relationships between industry partners, government agencies and surrounding communities by building lasting connections. Terry will leverage the Commonwealth's purchasing power to create opportunities for our educational and training opportunities for Virginians.
- **Host career-oriented, regional STEM-H and CS workshops.** Experiential learning is critical to STEM-H literacy and cultivating an interest in STEM-H career fields. In addition to offering summer programs, Terry will partner with the business sector to host regional STEM-H workshops featuring various industries and career opportunities with hands-on learning opportunities for students. Helping students to connect with their STEM-H identities early is critical to their long-term pursuit of STEM-H literacy and jobs. Hosting STEM-H fairs will create early industry exposure and help students understand what career opportunities could be available to them in the future. It will also

bolster informal learning opportunities and support relationships between school divisions and industry partners that will ultimately support the development of a highly-skilled workforce.

- **Partner with the business sector to engage students early and create virtual internships and apprenticeships.** A key part of reimagining our K12 education system and making sure every student has equitable access to a quality education is making sure we are equipping students with the knowledge and skills they need to succeed. Virginia has taken important steps to engage students as early as 7th and 8th grade about academic and career planning as part of Terry's high school redesign, but we have to continue to invest in high-quality internships and apprenticeships. Virginia must leverage the innovative virtual learning opportunities that have emerged during this pandemic and proceed with equity at the forefront. There is no reason that a student in Bristol or on the Eastern Shore cannot partner with an emerging technology company or another growing sector through a virtual internship or other program. Now is the time to think big and create a pipeline of workers for high-demand jobs.