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THE MARYLAND VIRTUAL CYBER SECURITY ACADEMY

Making Maryland the "Epicenter" of Computer Science Online Learning

BY DAN LIPS

IN 2010, GOVERNOR MARTIN O'MALLEY announced an initiative to make Maryland the "epicenter" of the growing field of cyber security.[1] This initiative appears well underway with the recent establishment of the new U.S. Cyber Command at Fort Meade in Anne Arundel County. As Gov. O'Malley stated, the Old Line State is already home to key federal agencies charged with the responsibility of cyber security, including the National Security Agency and the National Institute of Standards and Technology.[2] These assets are sure to lure defense contractors and cyber security jobs to the state in the years ahead.

As Maryland seizes this opportunity to become the hub of the critical field of national security, the O'Malley administration and policymakers in Annapolis should consider further opportunities to lead in the cyber sector. One emerging opportunity is for Maryland to lead in cyber security education.

For Maryland families, giving students the opportunity to master computer science and the requisite skills to compete for the new jobs in the cyber security field is an opportunity to gain a competitive advantage in a growing professional field, and an important national security sector. In addition, Maryland is positioned to provide leadership for the rest of the nation in developing cyber security educational programs, given the state's excellent higher education institutions (which are launching cyber security programs) and emerging government and private sector assets in this field.

This paper offers a vision for a "Maryland Cyber Security Academy," an online learning program to provide Maryland students and adults with the opportunity to study computer science and develop expertise for careers in cyber security.

Across the country, virtual or online learning is revolutionizing the ways students learn. American students of all ages increasingly benefit from the opportunity to learn using customized technologies that would have been unimaginable to previous generations. These revolutionary programs, which include full-time online learning schools, cyber charter schools, and blended-learning programs that use technology to supplement traditional instruction, are quickly growing in popularity. Some analysts predict that by the end of the decade half of all high school coursework will occur in a virtual setting.

Creating an innovative Maryland Cyber Security Academy will provide a range of benefits for the state and the country. For Maryland families, the Academy will provide students and adults with the opportunity to acquire skills in high demand in the twenty-first century. For the nation, the Maryland Cyber Security Academy could provide leadership for the nation, ensuring that American students acquire the necessary training and skills to meet the cyber security challenges of the future. Importantly, developing a pioneering cyber security online education academy could ultimately provide a lucrative source of revenue for the state by enrolling tuition-paying students from other states.

THE NEW SPUTNIK

In 1957, the launch of the Soviet Union's Sputnik satellite sent shockwaves across the United States. The dawn of the space race signaled a new challenge for American educa-

tion. It mobilized more than a half-century of federal and state initiatives aimed at ensuring that American students acquire critical skills in science, technology, engineering, and mathematic (STEM) education.[3]

In 2011, a new "Sputnik" event is changing how Americans think about national security, and the skills our nation will need to meet future national security threats. Richard Clarke, former adviser to the National Security Council in the Clinton and Bush administrations has warned for more than a decade of the potential of a "digital Pearl Harbor" that could disrupt and threaten our technologically-dependent way of life.

In his recent book *Cyber War: The Next Threat to National Security and What to Do About It* (2010), Clarke warns about the grave danger that computer network attacks pose to U.S. national security: "The United States is currently far more vulnerable to cyber war than Russia or China. The U.S. is more at risk from cyber war than are minor states like North Korea. We may even be at risk some day from nations or non-state actors lacking cyber war capabilities, but who can hire teams of highly capable hackers."[4] Clarke's book details the extensive threats that cyber threats pose to every aspect of American life that is dependent on computer networks and information technology.

Just as Sputnik launched decades of initiatives aimed to improve STEM education, the emerging challenge of cyber security is already mobilizing a new focus on increasing the pipeline of students educated trained in the field of computer science. In October 2010, a federal representative for the U.S. Department of Homeland Security declared that there simply were not enough qualified professionals to fill the positions of the federal government's growing cyber security workforce.[5]

Higher education institutions across the country, including in Maryland, are quickly creating new cyber security programs. In 2010, the University of Maryland University College announced a first-of-its-kind cyber security degree program.[6] In 2010, the U.S. Naval Academy in Annapolis created its own Center for Cyber Security Studies.[7]

While these efforts are a responsible approach, there is a risk that policymakers will repeat some past mistakes in the effort to improve STEM education in the United States, by simply focusing resources on educating students at the end of the elementary and secondary education "pipeline."

Homeland Security Analyst Jena McNeill and I addressed the problem of the "leaky pipeline" in K-12 STEM education in a paper for the Heritage Foundation in 2009:

> *Unfortunately, experience of the past 50 years suggests that such federal initiatives [general focused on the postsecondary level] are unlikely to solve the fundamental problem of American underperformance in STEM education — the limited number of students who complete elementary and secondary school with the skills and knowledge to pursue STEM coursework in higher education and succeed in many parts of the workforce. The American education system is supposed to be a pipeline that prepares children in elementary and secondary school to pursue opportunities in postsecondary education and in the workforce. It is well known that this pipeline is leaky — that millions of children pass through their K-12 years without receiving a quality education. Too many students drop out and, all too often, those who do earn a high school degree lack the academic qualifications to succeed in STEM fields in college or in the workforce.*[8]

Fortunately, exciting developments and innovations in technology and education are dramatically improving strategies for teaching elementary and secondary students critical skills. Specifically, the online learning revolution is ushering in a new era of American education that will allow all students to have access to the most innovative instructional models, which can sensibly be harnessed to provide superior instruction in computer science and cyber security.

WHY ONLINE LEARNING?

In September 2010, I presented an overview of the exciting benefits of online learning for improving education in a recent paper for the Maryland Public Policy Institute: *How Maryland Can Become a Leader in K-12 Online Learning.*[9] While readers can consult that paper for an in-depth overview, a few of the key points about virtual education will be presented in-brief here.

Our daily experience shows us the countless ways that innovations in information technology are transforming and improving American life. Yet traditional public education is one of the few sectors of modern society that remains largely unchanged. Today, most children attend schools that are much like the classrooms where their parents and grandparents learned. But this is quickly changing, and the next decade is likely to witness a fundamental transformation of public education thanks to the proliferation of online or virtual learning programs. Virtual education is already beginning to sweep the across the country.

More than a million children are already enrolled in some form of online or virtual education program. According to a survey by the Sloan Consortium, a majority of school districts nationwide had students receiving some form of online instruction.[10] Participation is expected to skyrocket over the next decade. Harvard University researchers project that, by 2019, 50 percent of all courses will be taught online.[11]

Online learning programs come in different forms, ranging from full-time virtual schools and full-time cyber charter schools to in-class blended learning programs that combine traditional teaching with computer-based instruction. A popular form of online learning is the state virtual school that allows students to take a variety of courses online to supplement their instruction. Maryland currently offers a limited number of students the opportunity to take online supplementary courses through the Maryland Virtual School.

While online learning remains a relatively new initiative, the emerging empirical evidence suggests that

computer-based instruction can be effective. A 2009 U.S. Department of Education meta-analysis of evidence-based studies of online-learning programs reported that "students who took all of part of their classes online performed better, on average, than those taking the same courses through traditional face-to-face instruction."[12]

GROWING BIPARTISAN MOMENTUM FOR ONLINE LEARNING

Policymakers on both the left and right are beginning to recognize the potential for online learning to revolutionize American education. In December, former Governor Jeb Bush of Florida, a Republican, and former Governor Bob Wise of West Virginia, a Democrat, launched "Digital Learning Now," a "national initiative to advance policies that accelerate the shift to digital learning."[13] As they unveiled this initiative, they presented a blueprint for "10 Elements of High Quality Digital Learning," which provides policymakers with action items for reforms. As states face the dual challenge of dealing with the challenging fiscal climate and the urgent need to strengthen public education, implementing cost-effective reforms to provide greater opportunities for students to learn online should present an attractive path for policymakers.

GENERAL ONLINE LEARNING RECOMMENDATIONS FOR MARYLAND

In the September 2010 Maryland Policy Report, I offered four policy recommendations for how the Old Line State could become a leader in giving students the opportunity to benefit from online learning options. These include:

1) Expand access to the Maryland Virtual School (MVS)
2) Reform the charter law to allow cyber charter schools
3) Expand hybrid online learning programs, encourage participation in MVS
4) Explore opportunities to partner with other states, schools, online learning providers.

THE HISTORIC OPPORTUNITY—THE MARYLAND CYBER SECURITY ONLINE ACADEMY

Beyond these reforms, Maryland could capitalize on a historic opportunity to become the leading state in the nation offering online cyber security education. Creating a first in the nation — Maryland Cyber Security Academy — would be an important way for the O'Malley administration to continue its initiative to make Maryland the epicenter for cyber security in the United States by taking the needed step of addressing the human capital pipeline challenge of creating a workforce prepared to fill the needs of this critical national security sector.

Task Force to Develop the Maryland Virtual Cyber Security Academy How could policymakers in Annapolis create the Maryland Cyber Academy? Starting in 2011, the O'Malley administration could create a legislative initiative to launch the Maryland Cyber Academy, beginning with the creation of a task force to develop a blueprint for the Academy in 2011. This task force should include key stakeholders from the national security sector (including representatives from government agencies and private companies that serve those agencies), representatives of Maryland's higher education institutions with cyber security programs, the Maryland Virtual School (which is pioneering online learning in the state) and other key stakeholders from the online learning community, and parents and educators.

Goals of the Task Force The goals of this task force would be the following:

1) determine the mission of the Academy
2) identify the necessary critical skills for the cyber security workforce
3) develop the foundation of a curriculum for the Academy and
4) create an implementation plan to develop a virtual or online learning program that will be launched in 2012 or at the beginning of the 2011-12 school year.

Important Issues for the Task Force to Consider When the task force is convened, a number of important issues should be considered in addition to the basic goals outlined above. These issues are presented below with initial recommendations:

- *What range of students should be served by the Academy?* We would recommend that the task force plan for the Academy to serve the widest range of students possible, by creating educational programs that could serve Maryland's elementary and secondary students as well as those in higher education or the workforce.
- *What educational providers should be charged with creating the Academy's educational programs?* While the task force will be well equipped to address this question, a smart approach could be to follow the model of the Maryland Virtual School, which already partners with other institutions to provide virtual programs. Higher education providers and private online learning companies could provide great value in developing and administering online learning programs for the Academy.
- *How will the Maryland Virtual Cyber Security Academy be funded?* This is a critical question to ensure that Maryland students can access the educational programs offered by the Academy. We would recommend that K-12 students attending the Academy be funded by a share of state appropriations that otherwise would be provided to their public schools. If funding were available, the state could also provide an independent funding stream to allow students with per-course scholarships to attend the Academy.
- In addition, the school could charge per-course fees to higher education students and other adults who would seek to take higher-level courses. The school could also be created with the mission of serving students in other

states by charging per-course fees that can be paid either by parents wishing to enroll their children or state or local governments that wish to partner with the Academy.

- *Could the Maryland Virtual Cyber Security Academy receive private funding to support its launch and ongoing operations?* The private sector, including both private companies in the cyber sector and philanthropic foundations, could be encouraged to support the launch and ongoing operations of the Academy. It is possible that an innovative school model with the potential to help address a critical national security challenge of strengthening the cyber security workforce could attract funding support.

THE BENEFIT OF AN ONLINE CYBER SECURITY ACADEMY

As the policymakers consider a potential plan to initiate an academy, they should understand the likely benefits that it would provide:

For Maryland Students Students across the state, and of all ages, would stand to benefit from the voluntary option of taking classes in computer science and cyber security. It is apparent that developing skills in information technology and computer science will likely provide students with lasting benefit over the course of their lives. These benefits include having a basic understanding of computer technology (that will likely provide very practical benefits in our increasingly high-tech society) to potentially acquiring knowledge and technical skills that will create future opportunities in higher education and potentially in the workforce, whether in the government or private sector.

It is important to stress that the Maryland Virtual Cyber Security Academy would be an optional program for students, so that only students who are interested in acquiring computer science skills would enroll in the program. Families should welcome the Academy as a new option that could complement a child's traditional K-12 education and potentially provide a very rewarding educational experience for those students who choose to participate.

For Maryland Taxpayers Creating a Maryland Virtual Cyber Security Academy could also provide benefits to taxpayers. Researchers evaluating online learning programs have found that these programs can operate at a lower cost than traditional in-classroom instruction.[14] In addition, the Academy could present a source of revenue in the future if its services were made available to people and schools around the country that pay to enroll students for courses. As described above, the Academy could attract capital from philanthropists and companies that wish to support the worthy mission of improving educational opportunities and expanding the talent pool of skilled adults to fill cyber security positions in the workforce in the future.

For the United States Beyond these immediate benefits for Maryland students and taxpayers, the Maryland Virtual Cyber Security Academy could provide long-term value for the United States in tackling what many experts view as a critical national security challenge of the future. For more than 50 years, national leaders have identified training students in critical STEM fields as an important priority for national security. Maryland is already taking the lead in becoming the "epicenter" of cyber security. Creating a Virtual Academy to help students develop expertise in the field of computer science would be a natural continuation of these efforts.

CONCLUSION

Governor O'Malley has identified cyber security as a priority for his administration. In 2011, Maryland policymakers should take the next step in making the state the "epicenter" of cyber security by developing a first-in-the-national virtual academy for cyber security. Across the country, online or virtual learning programs are transforming and improving education. Maryland has a unique opportunity to harness the most innovative learning platforms in education and provide a valuable service for the nation in expanding the pool of skilled professionals that will be needed for an emerging national security priority.

DAN LIPS *is a senior fellow with the Maryland Public Policy Institute. The views expressed in this paper are his alone.*

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