Partnership to Advance Education and Training (PACET)
University at Albany, State University of New York
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The field has tremendous workforce need at all levels, and there are well-established deficits in training and resources for public and private-sector jobs in New York and nationally. A key challenge facing cybersecurity education is the gap between educational programs and the talent required by the industry. Dual consequences of this are graduates not finding jobs and the unfulfilled demand in the industry remaining. Th **Partnership to Advance Education and Training (PACET)**, through collaborative effort among partners in government, industry, and academia in conjunction with NIST, has strengthened the educational pipeline, to advance access to, and student workforce success in, New York's Capital Region. This area has unique workforce potential, with its range of higher education institutions and STEM graduates, and growing advanced technology sectors. PACET has also helped bridge the gap between education and industry needs by building clarified educational ladders, and workforce capacity regionally for a range of potential careers in cybersecurity, based on industry needs.

The partnership was built on existing relationships, forged through collaborations and common interests. In 2013, UAlbany developed curricula alignment and articulation agreements with HVCC and SCCC to facilitate transfer of community college students to UAlbany's new Digital Forensics program. Several funded projects for pedagogical innovation in cybersecurity have supported NIST's efforts to develop high-quality hands-on education at UAlbany that is well aligned with industry needs. In 2013, UAlbany worked with its community college partners on NSF SaTC grant number 1318483 *EDU: Flipping the Online Security Classroom – Improving Retention of Security Student Pipeline Through Early Intervention,* to improve the retention of information security students through flipped online lectures and shared curriculum, and experiments designed to measure their effectiveness. For example, UAlbany through a grant from SUNY built a platform to provide virtual laboratory resources for our regional Community College partner institutions, creating synergy with other colleges and better preparing students moving from community colleges to join 4-year programs.

The NICE Cybersecuriy Workforce Framework was used as a foundational rubric in establishing regional commonality in education, training, and workforce needs. UAlbany started the BS in Digital Forensics program in 2013, and then mapped its program to the NICE Framework, and encouraged programmatic mapping among partner, and other regional educational providers. The mapping provided a common reference point for students, employers, and all stakeholders. Through this mapping, gaps in education, training and certification resources were identified (moving from Categories through Specialty Areas and KSAs) and addressed among PACET partners. The NICE Framework was used as a guide for the project's multi-level development of workstation activities, case studies, and skill-building exercises in UAlbany's Cyber Innovation Lab for training programs and workshops.

PACET has leveraged the NIST Workforce Framework to bring clarity to workforce needs in the Capital Region; streamline and map educational and training programs; provide regional cohesion and outreach about internship and job opportunities; and develop new opportunities through education and training (internships and camps) to bolster workforce capacity regionally. Through these initiatives UAlbany has established itself as a hub for cybersecurity education and training – providing leadership in the Capital District. Several initiatives were undertaken as a part of this work, as outlined below.

As a first step, an advisory board was established, which included representatives from our partner institutions, local colleges, regional planning commissions, and from local firms and New York State government. The PACET Cybersecurity Advisory Board has helped to assess and review our work, and provide guidance on curricular changes, creating internship pipelines, and helping to streamline student hiring practices. This board has attracted several major firms from the Capital District and has become a strong conduit to internships and full time jobs for cybersecurity graduates. The role of the board includes providing assessments of the content and quality of the curriculum as necessary; offering guidance on the skillsets needed in the public and private sector in the region; supporting the Cyber Innovation Competition, including judging the competition, mentoring teams, critiquing business plans, and promoting the event; helping connect and collect data from regional firms; support interships and final placements of students.

UAlbany curricula was mapped against the NICE Workforce Framework. Partner colleges were encouraged to map their programs as well, so that any regional gaps could be identified, and addressed, through UAlbany programs. We worked with our partner community colleges to help them map their curricula to the NICE Framework, resulting in changes to curriculum across institutions in the Capital District. UAlbany's revisions to the curriculum culminated in the UAlbany Digital Forensics program being designated as a Center for Academic Excellence in Cyber Defense education by the NSA. To meet the educational needs in cybersecurity, the university designed a new 1-year MS program in Digital Forensics, which was approved by the New York State Department of Education in summer 2019.

A regional Workforce Assessment Survey was conducted, to gather detailed information regarding regional cybersecurity workforce capacity and needs. The survey included regional firms from a range of industries, as well as firms that recruit from the Northeast (at UAlbany and NY State Information Technology Services). For local firms, we leveraged connections with the Chambers of Commerce and Regional Economic Development Councils. Our initial response rate for data collection was low, however, using personal connections we were able to gather enough data to get a more comprehensive view of the needs of the Capital District. This provided insight into future curriculum development and placement of our students.

One of our key initiatives was to create a pipeline of students from tCyberExplorers, a weeklong day camp, which was offered in the summer of 2017. It was free of charge to accepted students from local high schools. Our goal was to provide inner city children with cybersecurity exposure and knowledge. A bus service was provided to ensure that transportation did not become a bottleneck for the students. The results of the program were mixed; some students found it too advanced while others found it engaging and rewarding. In subsequent years, we have combined this with the NYS Conference as a half-day event for middle and high school students. We are planning a one-day event in October for high school students as one of the events in the National Cybersecurity Awareness Month.

We have also organized professional training for executives and management during the NYS Conference, with strong reviews. In conjunction with local industry, we launched a series of lunch sessions for regional executives to to provide guidance on how to make risk-based decisions for cybersecurity. These sessions are planned by the Cybersecurity Advisory Board, and each firm takes a turn in sponsoring a talk.

A key outcome of our efforts at streamlining the curriculum, building bridges with the industry, and setting up the Cybersecurity Advisory Board is improved placement for our students, and industry satisfaction with the quality of our students. We started cyber-specific job fairs in the spring of 2018, through our Advisory Board, and have held one each semester since. Thanks to these fairs, we have a 100% placement of students from the program and the firms coming to the event have been constantly increasing, including the Center for Internet Security, New York State ITS, GreyCastle, Secure Decisions, NYISO, PWC, NYSTEC, General Electric, MVP Health Services, Rational Enterprises, Xchangeworx, Albany Medical Center, and MVP Healthcare.