Board 228: Building Partnerships for Advanced Manufacturing Programs

Dr. Karen Wosczyna-Birch, National Center for Next Generation Manufacturing

Dr. Karen Wosczyna-Birch has been a champion of engineering and technology education for over 30 years. Since 1995, she has been the state director of the CT College of Technology (COT) where her leadership has been instrumental in creating nationally recognized seamless pathway programs in engineering and technology between all 12 public community colleges in CT with 10 universities and technical and comprehensive high schools. She is also the Executive Director and Principal Investigator of the National Center for Next Generation Manufacturing (NCNGM), a National Science Foundation (NSF) Center of Excellence and a Professor of Applied Technology at Tunxis Community College. She has received over $30M in funding from the NSF, including two grants for international partnerships. Karen has implemented strategies resulting in an increase in the enrollment of underrepresented populations in STEM programs at the community colleges.

Karen has received numerous awards for her accomplishments as a professor and for her passion for increasing the diversity of the STEM population including the 2016 Distinguished Service Award from the international honor society Epsilon Pi Tau (EPT), the 2018 CT Women of Innovation Award in the Postsecondary Academic Innovation & Leadership Category, the 2012 New England Board of Higher Education Excellence Award for the State of CT and most recently, the 2020 HI TEC Innovative Program of the Year Award and the 2021 ITEEA Special Recognition Award. In 2014, she was invited to the White House College Opportunity Summit recognizing leaders like Karen for their commitment to STEM education. She also serves on numerous local and national boards including the Epsilon Pi Tau Honor Society, Hartford High's Pathway for Engineering and Green Technology, and the Connecticut Technical Education and Career System.

Building Partnerships for Advanced Manufacturing Programs

The mission of the National Center for Next Generation Manufacturing (NCNGM), funded by the National Science Foundation Advanced Technological Education (NSF ATE) Program, (DUE #2247026) is to cultivate and nurture partnerships with advanced manufacturing stakeholders, creating a national network throughout the United States to further develop a diverse technical workforce. The NCNGM partners include collaborators from education, industry, government, and private and public organizations. Each member of the NCNGM's leadership team is experienced in developing and maintaining a program for their specific advanced manufacturing discipline and offers expertise in partnerships providing benefits to both the program and the partner. Examples of the benefits include scholarships, instructor recruitment, work and learn programs, and national dissemination. The NCNGM has developed resources and best practices for fostering partnerships for community college advanced manufacturing programs, including unexpected collaborators.

According to a study by Deloitte and the Manufacturing Institute [1], **"**Over the next decade, 4 million manufacturing jobs will likely be needed, and 2.1 million are expected to go unfilled if we do not inspire more people to pursue modern manufacturing careers." The NCNGM and its partners are working together to address the nation's need for a pipeline of students equipped with the skills to pursue careers in advanced manufacturing with an emphasis on Industry 4.0 technologies. Building the pipeline requires many components that partnerships can help provide. This paper will provide best practices with examples for developing and maintaining partnerships with various organizations at local, statewide, and national levels that have helped programs grow and overcome challenges to educate a diverse advanced manufacturing workforce.

The NCNGM is led by the Connecticut College of Technology (COT), which provides pathways for students in engineering and technology programs at the 12 Connecticut State Community College campuses and includes partnerships with 10 public and private four-year universities, comprehensive high schools, and the Connecticut Technical Education & Career System. Since 1995, the COT has provided these pathways based on the needs of the advanced manufacturing industry in Connecticut and has provided various opportunities for partnerships among academia, industry, government, and additional organizations with an interest in workforce development. With the need for short-term programs, the COT partnered with the Business-Higher Education Forum (BHEF) and the New England Board of Higher Education (NEBHE) for the Connecticut Digital Talent Ecosystem Initiative (DTEI), and worked with companies, two- and four-year and colleges, government agencies, industry, and other Connecticut stakeholders to develop new pathways to digital skills and credentials. Using real-time job postings data, employers with the capacity and need to hire new digital tech talent were identified. These employer-partners articulated knowledge, skills, and abilities (KSAs) sought for entry-level positions in a broad range of occupations. The COT, with BHEF and NEBHE, mapped these KSAs to current course offerings and re-bundled competencies as digital foundation credentials. These credentials will be marketed to low-income and displaced workers. Individuals who complete the credential will be well-positioned to gain employment with employer-partners or continue along a high- value credential pathway. Industry partners on this project are Stanley Black & Decker, Accenture, and Pitney Bowes. Companies have committed to internships, curriculum and credential review and

validation, and providing data sets that faculty can use as real-world examples in data science courses. The credentials are designed as low-cost education resources that to enable rapid deployment and accelerated scaling. A Foundations is Digital Analytics Certificate was also developed and approved for implementation at Capital Community College and Northwestern Connecticut Community College.

The COT had an unexpected partnership that has also resulted in unexpected outcomes. A partnership with the American Association of Retired Persons (AARP) of Connecticut began with AARP looking for ways to help members "recareer" after age 50. Through a partnership with the COT, they were able to advertise advanced manufacturing education and careers as well as opportunities to for retired manufacturers to be mentors and instructors in high schools and community colleges. Three workshops were held for retirees to introduce them to teaching opportunities and an article was published in the national AARP Bulletin on career pathways in advanced manufacturing. Through this partnership, AARP of Connecticut also offered scholarships for community college advanced manufacturing students who are age 50+.

Central Community College in Nebraska, a lead for the NCNGM, has partnered with industry in mechatronics and injection molding to build labs. Industry partners have provided equipment to keep the labs up to date, so students are learning on machines that are currently being used by the workforce. State-of-the-art labs paired with US Department of Labor and National Science Foundation funding have also allowed for further program development, outreach to potential students in middle schools and high schools, and professional development for high school and community college educators.

Columbus State Community College in Ohio, another lead for the NCNGM, engages with their industry partners through the Earn-and-Learn Model. In this model, faculty at the college work with new industry partners to determine workforce needs and begin by asking them to participate in smaller activities such as hosting a tour or attending an event. More established partners are considered co-contributors for the programs and are invited to present during activities such as career awareness school visit and provide feedback on the program. Strong industry partners become part of the Earn-and Learn Model where student cohorts attend courses and career preparation activities and utilize wraparound services and advising sessions in preparation for on-site work experiences. The industry partners are part of the student recruitment process for the program and participate in career preparation activities and a student interview process. These partnerships provide a real-world experience for students and continuous program feedback for the college.

The key to finding partnerships is continuous networking and participation not only through discipline-related activities, but also through those related to communities local to the campus. Seeking partnerships from organizations that are not considered traditional for advanced manufacturing or education may lead to opportunities to solve challenges a program has been facing such as faculty or student recruitment, funding of initiatives, and dissemination of activities. Overall, partnerships provide important resources and insights for ensuring that advanced manufacturing programs meet industry's workforce needs.

[1] P. Wellener, V. Reyes, H. Ashton, C. Moutray, “Creating pathways for tomorrow’s workforce today,” *Deloitte Insights*, 4, May 2021. [Online]. Available: https://www2.deloitte.com/us/en/insights/industry/manufacturing/manufacturing-industry-diversity.html/#executive-overview [Accessed: 9, February, 2023].