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BOARD # 325: ATE: Regional Industry-Focused Micro/Nanotechnology Education Partnership

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Dr. Jens-Uwe Kuhn serves as PI for this NSF ATE funded project at Santa Barbara City College. He has extensive experience in collaborating with the Center for Science and Engineering Partnerships and the California NanoSystems Institute at the University of California Santa Barbara, which provides the cleanroom facility for this project. He works directly with many local industry partners and regional stakeholders on this project, including on efforts around its sustainability.

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Abstract

The CC-PRIME project is a regional collaborative effort between Santa Barbara City College (SBCC) and the University of California Santa Barbara (UCSB) to provide educational pathways in the micro nano technology sector for community college students. This project is funded through the Advanced Technological Education (ATE) program in the Division of Undergraduate Education (DUE) at the National Science Foundation (NSF). It includes several local industry partners, ranging from small to medium-sized companies, providing input through the project's Industry Advisory Board (IAB) into the local workforce needs in the field and associated training components. The project enables community college students to utilize advanced cleanroom facilities at UCSB with the goal to provide them training and experiences in semiconductor manufacturing. Additional project goals are to create a student educational pathway to acquire semiconductor manufacturing jobs in the region, and to build industry visibility in the community.

In the first two years of the project, existing training modules from the Support Center for Microsystems Education (SCME) at the University of New Mexico have been adapted to meet local industry needs and develop an initial cleanroom training bootcamp. Project staff and faculty were initially trained on the SCME curriculum, which then was adapted and implemented on site at UCSB. Initial training included community college faculty and existing industry employees for up-skilling purposes. Subsequent training bootcamps exposed community college students to work inside one of the cleanroom facilities at UCSB. With input from local industry partners and IAB members, additional training and modules are in development to further build-out corresponding educational opportunities for community college students and to broaden the initial cleanroom training.

This poster will summarize the project activities, results, challenges, and lessons learned from the first two years of the CC-PRIME project.

Introduction

Santa Barbara City College (SBCC), a public community college and Hispanic Serving Institution on the Central Coast of California, is leading the CC-PRIME project, a collaborative effort between SBCC and the University of California Santa Barbara (UCSB), a local 4-year institution. The project is leveraging advanced cleanroom facilities at the university and input from local industry partners to build training pathways to meet demand for local job-ready cleanroom technicians.[1], [2], [3], [4] In addition to building out pathways for local community college students to obtain jobs at the technician- or operator-levels with local semiconductor

industry partners, the CC-PRIME project also aims to increase local awareness of industry partners being present in the local community, their fields, and associated job requirements and openings.[5]

Project Activities

The initial cleanroom training module was developed as a 40-hour training based on successfully implemented curriculum at SCME and KSAs developed at NSF-funded ATE Centers.[6], [7] CC-PRIME project staff and faculty completed the training in person at the Support Center for Microsystems Education (SCME) at the University of New Mexico prior to training roll-out at SBCC. Local Industry Advisory Board (IAB) members provided input throughout the curriculum development process, its adaptation from SCME's curriculum, and its initial piloting with community college faculty. Focus groups and evaluations carried out by an external evaluator of the initial faculty training and subsequent student-focused training bootcamps provided additional input into adapting and revising the cleanroom curriculum.[8], [9]

Student exposure to and hands-on experience inside the cleanroom were identified by IAB members across specific sectors as critical components for the initial training bootcamp module. Utilizing the advanced cleanroom facilities at UCSB and engaging instructors and industry experts trained on their equipment proved critical to achieving this training goal. The initial pilot training was held in summer 2022 and focused on training community college faculty and upskilling incumbent industry employees, both of whom had some background in the field, although no prior cleanroom experience. This pilot was followed with an initial community college student-focused training in summer 2023 with students with very limited background in semiconductor-related fields. Subsequent iterations of the training have continued in 2024.[5]

Results

Focus group interviews and surveys from the external evaluator showed that participants felt that the training experience did meet their expectations. Industry needs assessment and follow-up showed alignment with KSAs and industry-backed learning outcomes. In addition, faculty participants reported gaining a better understanding of local semiconductor-related industry, semiconductor manufacturing technician workforce requirements and associated job opportunities.[8], [9], [10]

Working collaboratively with both industry partners and a 4-year university, to align training modules with industry needs and access an industry-standard cleanroom facility that would otherwise not be available to community college students have been critical to the successful launch of the initial bootcamp training. In addition to meeting KSAs identified for semiconductor manufacturing technicians, training supported by local industry partners also needs to meet their specific training needs at some level. Utilizing existing and established curriculum and adapting it to local or regional needs identified from IAB members greatly streamlined the development of the initial hands-on training modules.[7], [11] Initially training community college faculty not only allowed for piloting of new curriculum, but also served as important faculty professional development and aided efforts around increasing awareness of the semiconductor industry and related job opportunities in the local community.[5]

Future Directions

The CC-PRIME project is continuing to build on the strong collaboration with local industry partners, as well as the cleanroom facility at UCSB.[2], [3], [12] While continuing to run the initial cleanroom bootcamp to expose additional community college students to cleanroom work, a more in-depth MicroChip Fabrication course is in the pilot phase, with additional courses being developed to further expand the semiconductor training pathways for community college students in the region.[5]

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