### Evaluation of

### Rowan College at Burlington County’s

### *NSF-ATE*

***Comprehensive Integration of Advanced Manufacturing Competencies throughout Associates degree and Stackable Certificate Curricula Grant***

**Year 3**

### July 1, 2018 - June 30, 2019

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**LDPlatt Strategies**

**July 15, 2019**

**Background**

The *Comprehensive Integration of Advanced Manufacturing Competencies Throughout Associates Degree and Stackable Certificate Curricula Program* is a three-year $768,272 grant from the National Science Foundations’ Advanced Technological Education (ATE) program. The original three-year period was September 15, 2016 to August 31, 2019. The college has been awarded a one-year no-cost extension with a new end date of August 30, 2020.

In addition to the year-long extension the only other change this year was the addition of Prof. Ratneshwar Jha, Head of Mechanical Engineering at Rowan University as the new co-PI with Dr. Spang. Prof. Ratneshwar Jha replaces Dr. Eric Constansas who stepped down at the beginning of the fall semester. (Note that NSF was notified of this change at the time it occurred.)

## The grant focuses on the education of technicians within the high-technology mechanical engineering and advanced manufacturing fields at both the associate and baccalaureate levels. Specifically, the grant supports curriculum development; professional development of college faculty and secondary school teachers; and career pathways from secondary schools to two-year colleges and from two-year colleges to four-year institutions.

## Rowan College at Burlington County is the lead institution and is partnering with Rowan University to provide seamless transition from the associate to baccalaureate degree. Collaborators also include high schools throughout Burlington County as well as the advanced manufacturing industry.

The project has two primary goals:

## Goal 1: To strengthen and expand an Engineering Technology program serving the southern New Jersey region.

Goal 2: To serve as a conduit for the creation of programs and educational pathways that address unmet training needs and the needs of emergent high growth industries, both in the region and nationally.

**Evaluation Scope, Approach, and Methodology**

The Year Three evaluation covers the period of July 1, 2018- June 30, 2019. During this period the evaluator focused on program implementation activities and progress in meeting intermediary outcomes. To assess progress the evaluator collected and reviewed advisory committee meeting minutes, curricula, partner/industry feedback, surveys, the micro site, website and notes from workforce development meetings. The evaluator worked remotely with the PI and project coordinator and conducted an end of year site visit on June 25, 2019. Since the first cohort of MET students was delayed until September 2019, the evaluation questions were modified, and student outcome data will not be collected until the end of the extension year.

Below are the evaluation questions for Year 3.

* Has the project made sufficient progress in completing Year 3 activities?
* Did the college successfully create a new academic program in Advanced Manufacturing and a set of stackable credentials? What are the enrollments/outcomes?
* Did the college establish an Advanced Manufacturing Training Facility as originally intended?
* What influence has industry participation had on the development of the MET curriculum?
* Is the curriculum aligned with industry needs? (What evidence do we have?)
* Has the grant had any impact on other disciplines within the STEM Division?
* Has the college created a pathway from secondary schools to two-year colleges and from two-year colleges to four-year institutions? Is the pathway viable?

Accomplishments/Major Activities

The college has asked for a no-cost extension to complete its project implementation activities. The extension is necessary because the college was notified of the award in September 2016, so it could not begin the project until January 2017.

Even with the extension, the college has made sufficient progress and the evaluator does not see any concerns regarding its ability to complete the project as planned by the new end date. Note that the college continues to keep all stakeholders apprised of developments and implementation activities and outcomes. To maintain stakeholder engagement the college intends to

host a Grant Update and Curriculum Pathway Forum in the fall.

* ***MET Program***

RCBC has developed a new degree in Mechanical Engineering Technology, with a concentration in advance manufacturing that emphasizes the practical hands-on application of engineering principles. The MET program will accept its first cohort of students in the fall 2019. To date 16 students have declared MET as a major and registered for courses. Another 15 or so have declared MET as a major but have not yet registered for classes. The program was supposed to begin in September 2018 but was delayed one year. During this time Rowan University developed two baccalaureate degree programs, one in Mechanical Engineering Technology and a second in Electrical Engineering Technology. Both of these programs will articulate with the associate degree programs at RCBC. RCBC will pursue ABET accreditation for the MET program beginning in 2021 after its first cohort completes the AAS degree. Note that RCBC’s EET program is already accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET. Rowan University will pursue ABET accreditation for its new programs in 2023 after producing its first set of baccalaureate graduates.

* ***Stackable Credentials to Support*** ***Clear Career Pathways***

The college has created the MET curriculum to allow students to earn stackable credentials (10-15 credits) that lead to a certification in a discrete set of skills. Because certificates are stackable they can transfer into the two-year associate degree. The certificates are a model for other STEM programs. They are targeted to employees who want a particular skill, high school students who are interested in the field and/or students in other degree courses who may want a particular set of skills in addition to their own degree. The program currently employs 1 full time faculty, 1 part time coordinator/faculty and 3 adjunct professors.

* **Advanced Manufacturing Training Facility**

The college has identified a classroom/lab in the Technology Engineering Center that will be converted and used as the new advanced manufacturing training facility. The college has used grant resources to purchase one piece of approved equipment and is using Perkins funding to purchase other equipment. The facility will be fully operational in the fall 2019.

* ***Enhancing Engineering Technology Programs***

The College used the development of the Mechanical Engineering Technology program as an opportunity to enhance the EET program. EET is no longer Electronic Engineering Technology; it has become Electrical Engineering Technology and fully aligns with the new BS program at Rowan University. RCBC currently has 46 students enrolled in its EET program with expectations that both the EET and MET program will grow significantly over the next three years. So much so that both programs have been approved for the new 3 + 1 program to be offered exclusively at RCBC’s Mount Laurel Campus. RCBC will teach the first three years of both the EET and MET program with the fourth year taught by Rowan University faculty. The anticipated growth of this career pathway program has prompted Rowan University to create a new Department of Electrical Engineering Technology. The University has hired a full-time chair to run the department and located the position on the RCBC campus.

* ***Industry Collaboration and Advisory Boards***

Through the development of the MET program RCBC has significantly changed the way industry interacts with the college. Over the last three years the college has collaborated and interacted with more than 35 industry representatives. These interactions have occurred through forums, workforce development initiatives, site visits, Advisory Board meetings and surveys. These collaborations are ensuring that the new MET program will accurately reflect the industry skill standards most important to the manufacturing base in the region.

During Year 3, the college conducted an industry survey seeking input on the types of skills, certifications and trainings needed by the industry. As the first chart indicates most representatives believe that quality control, technical reading, and problem solving are important for almost all of their industries.

**CHART 1**

When asked if their company would require certifications in the future, 26 of the 35 (74 percent) responded that they were likely or very likely to require certification. As the chart below indicates respondents identified different priorities from the six presented, with the most important being certification in the use of test equipment (including oscilloscopes, multimeters and micrometers) followed by computer programming and AUTOCAD.

Note that 74 percent also said they prefer to have certification training conducted by an educational institution.

**Chart 2**

One of the most important collaborations has been the advocacy of the MET/EET Advisory Board. Lead by a very engaged industry representative, the Board’s purpose is to advise, assist, support and advocate for the MET program. The Board is made up of approximately 20 representatives from industry, the two colleges and secondary schools. To date the Advisory Board has met a total of 7 times. During Year 3, meetings were held on October 3, 2018 with 19 attendees and January 23rd, 2019 with 20 attendees. Through these meetings and other collaborations, the Board has helped to identify the skills set needed by MET associate and baccalaureate graduates, helped identify learning opportunities for students and helped set the standard and process for other advisory boards within the STEM division. The Board has also recommended embedding more professional skills including writing, active listening, the ability to work with others, and communication into the curriculum.

* ***Outreach/Dissemination***

In April of this past year the college hosted its 3rd Annual Science Slam. The Science Slam features activities that aim to stimulate interest in STEM and inspire the next generation of engineers, scientists and health professionals. It is an opportunity to advertise EET programs to high schools’ students and engage them in activities. Advisory Board members participated in the activity.

The college also participated in National Engineering Week by hosting Dr. Magee-Sauer, Rowan University professor of Physics & Astronomy and past dean of Rowan University’s College of Science & Mathematics who discussed teaching STEM courses in high school and influencing students’ career decisions about STEM.

During Year 3 faculty visited high schools and middle schools to discuss career exploration. To further engage secondary students the STEM division used its mobile technology RV to introduce students to virtual reality and create excitement about the sciences.

The Dean and his staff also used their talents to assisted Burlington City High school with the successful acquisition of the Pathways in Technology Early College High School, (P-TECH) grant. This grant creates opportunities for students to earn college credits in the technology field while in high school. About 20 Burlington City students will participate in this new initiative beginning September 2019. They'll earn a degree in a STEM field from Rowan College at Burlington County and participate in internships sponsored by Centryco Inc., a manufacturing company that will also provide students with mentors.

The college has also partnered with Delran High School on the Delran STEM Ecosystem Alliance. The program is part of the NJ STEM Pathways Network. The Alliance is comprised of industry leaders, community organizations, higher education institutions, teachers, parents and pre-school partners and serves students by connecting them with meaningful STEM learning experiences.

As part of dissemination Dr. David Spang-PI, Prof. Ratneshwar Jha Co-PI, and Dr. Edem Tetteh presented a session at the 2019 American Society for Engineering Education Conference in Tampa., Fl. The session titled ***Innovative Mechanical Engineering Technology Pathway***

***Aligned with Industry Needs*** shared the successes of using an advisory board to help develop curriculum that addresses industry needs.

**Next Steps**

The college has begun recruiting and enrolling students into the new MET and revised EET programs. The evaluator will use the extension year to track student outcomes (retention, GPA, graduation, transfer) within the MET and EET academic degree and certificate programs.

Faculty are in the process of finalizing the applications database. The college has three applications available and will continue to add to the library over the course of the year. This principals-based library will supplement application of learning by adding specific simulations, case studies, and /or new technologies. The college will use the next year to train faculty and secondary teachers. The evaluator will work with the college to survey faculty and teachers on the impact of the applications library. Through the college’s outcomes assessment system, the evaluator expects to be able to track the effectiveness of the applications library on learning outcomes for classes where the integration of the library and use of applications is part of the curriculum.

The college has successfully engaged the advisory Board resulting in a MET program that has both industry input, and buy in. The question now is how the Advisory Board should maintain its engagement, so it can continue contributing when the requirements of the grant have ended. The evaluator recommends that the college use the April advisory board meeting to strategically plan for the next three years. The goal would be to develop a set of strategic initiatives that will:

* + use the Boards connections to help advertise the program and its graduates,
	+ help the Engineering Technology program (including MET) grow, including identifying opportunities for internships and experiential learning.
	+ identify other certificate programs to support workforce development. Note that when asked 20 of the 35 industry representatives could list specific certification programs that they would like to see the college offer. Using this list as a starting point the Board could begin identifying and prioritizing regional certification needs.
	+ identify resources that can be leveraged to support the development of a skilled workforce. These resources include those of industry and the colleges, teacher training initiatives and faculty.
	+ Expand the involvement of industry in secondary activities that engage students in technology. (Note that Board minutes indicate that there are many ideas including STEM scouts, Robotics….)

As we close out the grant it would also be helpful to administer a Board survey that will measure the success of industry involvement. This survey should be tied to the outcomes of the grant. Considerations should be given to the following questions:

* + As a Board do they feel connected and are they learning from one another?
	+ Do Board members feel that their voice and input was taken into consideration?
	+ Was the discussion relevant and useful to them?
	+ How satisfied are they with the outcomes they see?
	+ Is there an outcome that they feel is missing?
	+ Do they have a better understanding of how to work with higher education?
	+ How do they see their involvement in the future?
	+ Do they plan to hire RCBC and or Rowan students? if so how many? Do they know how to recruit from the college?