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Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
Federal Grant or Other Identifying Number Assigned by Agency:	1601487
Project Title:	Comprehensive Integration of Advanced Manufacturing Competencies throughout an Associates Degree and a Stackable Certificate Curricula
PD/PI Name:	David I Spang, Principal Investigator Eric W Constans, Co-Principal Investigator Edem G Tetteh, Co-Principal Investigator
Recipient Organization:	Rowan College of Burlington County
Project/Grant Period:	09/15/2016 - 08/31/2019
Reporting Period:	09/01/2017 - 08/31/2018
Submitting Official (if other than PD\PI):	N/A
Submission Date:	N/A
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	N/A

Accomplishments

* What are the major goals of the project?

The major goals and Objectives of the project are outlined below:

Goal 1	To strengthen an Engineering Technology program serving the southern New Jersey region.
Objective	<i>Highlight technical and non-technical (soft) skills across the curriculum; align with industry needs, including</i>

1.1	<i>student work-based learning opportunities such as undergraduate research projects and internships.</i>
Objective 1.2	<i>Develop an applications library (real examples of STEM principles for instructional practices) as a resource for faculty to support relevant curriculum by presenting industry-relevant competencies, techniques and images that meet predetermined learning outcomes.</i>
Objective 1.3	<i>Strengthen career pathways throughout, and partnerships between, regional higher education institutions, secondary schools, and industry partners. Activities will include the creation of advisory committees, student work-based learning activities, and job placement support. Focus will be on job placement and recruitment support for graduates and industry partners. Additional emphasis will be on successful job placement for underrepresented student populations.</i>
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.
Objective 2.1	<i>Create a new academic program in Advanced Manufacturing (Associates Degree and a stackable certificate) by developing new curriculum through the adaptation of relevant models from national and regional NSF ATE programs, to support the Engineering Technology (ET) educational needs in the region.</i>
Objective 2.2	<i>Establish an Advanced Manufacturing training facility with input from industry leaders and educators to collaborate and produce skilled competent workers for industry.</i>

For the period under consideration, several stated Objectives have been pursued and accomplished. These have included Objectives under both major Goals of the project.

*** What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

Goal 1: "To strengthen an Engineering Technology program serving the southern New Jersey region"

The project team has gained information through previous activities relating to Objective 1.1 under Goal 1, namely to: "Highlight technical and non-technical (soft) skills across the curriculum; align with industry needs, including student work-based learning opportunities such as undergraduate research projects and internships." This important information was gathered through activities such as the technology conference that RCBC hosted in July 2017. At this conference, 59 participants including academic and industry partners discussed the critical skills and competencies that are needed in industry and should be reflected in the developing MET curriculum.

Also in support of Objective 1.1, Dr. David Spang (Principal Investigator) and Dr. Edem Tetteh (Co-Principal Investigator) have visited four industry partner sites to discuss the goals of the grant and to solicit input to the project.

This information has informed the development of Objective 1.2: "Develop an applications library (real examples of STEM principles for instructional practices) as a resource for faculty to support relevant curriculum by presenting industry-relevant competencies, techniques and images that meet predetermined learning outcomes."

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."

Project Objectives supporting this goal include Objective 2.1 "Create a new academic program in Advanced Manufacturing (Associates Degree and a stackable certificate) by developing new curriculum through the adaptation of relevant models from national and

regional NSF ATE programs, to support the Engineering Technology (ET) educational needs in the region.”

Project activities related to this major Goal and Objective included the creation of a Mechanical Engineering Technology (MET) associates of science degree at Rowan College at Burlington County (RCBC) and a corresponding baccalaureate degree, in MET, at Rowan University (RU). Both institutions, as collaborative partners involved in the current project, have worked to create a seamless pathway toward baccalaureate attainment, in an affordable and efficient manner.

Specific Objectives: The applications library development has begun during the reporting period after the formation of a well-represented industrial advisory committee. With relevant input from advisory committee members, several meaningful applications of scientific and technical principles have begun to be developed according to the designed format to:

- 1) Have readily identifiable significance
- 2) Be summarized and communicated effectively
- 3) Have significance to an emerging student
- 4) Follow a sound pedagogical approach

Significant Results: Students will have the ability to study MET at RCBC as part of a “3+1” program with RU. In this model, students will pursue the first three years of high quality study at RCBC at the affordable community college tuition rate. Students will then transfer to the fourth year of the program, taught by RU on the RCBC campus, to complete the BS requirements and be awarded the BS degree in MET by RU.

Key outcomes or Other achievements: Further innovative developments supporting the goals of the project include the creation of a new Engineering Technology department within RU’s School of Engineering. An additional and similar linkage between both institutions will be created for the electrical engineering technology (EET) discipline, both of which demonstrate elements of the broader impact of the current project.

*** What opportunities for training and professional development has the project provided?**

Training and Professional Development has been conducted during the reporting period in several ways. These opportunities have included communications with, and presentations to, the engineering technology advisory committee regarding the development of relevant applications for the applications library. Additional professional development has included opportunities the project team experienced by attending the annual American Society for Engineering Education (ASEE) conference in Salt Lake City, Utah, in June 2018. In addition to presenting the accomplishments of the current project, team members were able to acquire a wealth of information regarding similar projects and possible future project activities.

*** How have the results been disseminated to communities of interest?**

Dr. David Spang (Principal Investigator) and Dr. Edem Tetteh (Co-Principal Investigator) were present at the National Science Foundation ATE Principal Investigators Conference in Washington DC, in October 2017. At this conference, the project was displayed and described in the showcase session.

Additionally, the project team, led by Dr. David Spang (Principal Investigator) and Dr. Edem Tetteh (Co-Principal Investigator), delivered a paper and presentation entitled “A Model for Aligning Engineering Technology Curriculum with industry Needs” at the annual American Society for Engineering Education (ASEE) conference in Salt Lake City, Utah, in June 2018.

Additionally, as part of National Engineer’s week in February 2018, Dr. David Spang presented a workshop to students entitled “Calculation Impossible” which highlighted the use of mathematical and scientific principles in real-world applications, and highlighted work as part of the current project. Approximately 50 students, faculty, and administrators were in attendance.

Finally, in February 2018, RCBC held a “faculty and Industry Forum Update” meeting in which approximately 25 participants attended to learn of the progress and up-to-date outcomes of the project.

* What do you plan to do during the next reporting period to accomplish the goals?

The continuation of Objective 1.2 (development of the Applications Library), under Goal 1 (strengthen the Engineering Technology program) will continue during the next reporting period. Fully developed and available applications will be widely disseminated through a web page that will be created to support this function. Objective 1.3 (Career Pathways) will also be further developed now that both RCBC and RU have fully aligned MET and EET degree programs.

Additionally, Objective 2.1 (facility development), under Goal 2 (address unmet training needs) will be pursued. RCBC has made a commitment to assign existing and available space, as well as available financial resources, to fund the creation of needed engineering technology facilities in support of the new MET program. These resources will indirectly benefit the EET program as well and are another example of the broader impact of the outcomes of the current project.

Also, during the next reporting period, a survey will be submitted to industrial advisory committee members, and faculty, to gather information regarding the practical need for stackable certificates. Finalized marketing and advertising materials will also be created.

Finally, the MET and EET degrees and pathways will be finalized and marketed to students. Student enrollments will be carefully monitored to gauge the effectiveness of marketing and recruitment efforts.

Supporting Files

Filename	Description	Uploaded By	Uploaded On
Technology Conference Responses.pdf	Technology Conference Responses-Evaluation Summary	David Spang	06/13/2018
NSF ATE PI Conference 10.17.pdf	Poster presented at NSF-ATE Conference 10.18	David Spang	01/31/2019
Workshop-Calculation Impossible.pdf	Workshop-Calculation:Impossible	David Spang	01/31/2019
Industrial Advisory Board 5.18.pdf	Industrial Advisory Board Materials 5.18	David Spang	01/31/2019

Products

Books

Book Chapters

Inventions

Journals or Juried Conference Papers

Licenses

Other Conference Presentations / Papers

Dr. David I. Spang, Dr. Eric Constans, Dr. Edem G. Tetteh (2018). *A Model for Aligning Engineering Technology Curriculum with Industry Needs*. American Society for Engineering Education Annual Conference. Salt Lake City, Utah. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Other Products

Other Publications

Patents

Technologies or Techniques

Thesis/Dissertations

Websites

NSF-ATE Microsite

<https://atecentral.net/msites/dspang>

Additional products include the creation and population of the ATE micro-website, as well as the creation of marketing and advertising materials for the new MET program, including displays and the poster presented at the Annual NSF-ATE Principal Investigators Conference.

See also: <http://rcbc.edu/stem>

Supporting Files

Filename	Description	Uploaded By	Uploaded On
DUE 1601487 ASEE June 2018.pdf	ASEE Paper June 2018	David Spang	01/31/2019

Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Spang, David	PD/PI	1
Constans, Eric	Co PD/PI	1
Tetteh, Edem	Co PD/PI	1

Full details of individuals who have worked on the project:

David I Spang

Email: dspang@rcbc.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: As lead PI, Dr. Spang provides overall project leadership and management and oversees all major activities including curriculum development and pathway alignment. He oversees and coordinates the budget and the activities of the co-PIs, the project manager and project coordinator. Dr. Spang ensures that project activities are carried out on schedule and within budget. Dr. Spang co-authored the conference paper for ASEE.

Funding Support: None

International Collaboration: No

International Travel: No

Eric W Constans

Email: constans@rowan.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Serve as co-Principal Investigator. Dr. Constans participated in the forums and is an important member of the advisory committee. He is an integral team member for building the the pathway alignment for

the new MET program developed at RCBC.

Funding Support: None

International Collaboration: No

International Travel: No

Edem G Tetteh

Email: etetteh@rcbc.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 1

Contribution to the Project: Serves as co-Principal Investigator. Dr. Tetteh directs curriculum development for the new academic program in Mechanical Engineering Technology. He is responsible for overseeing the advisory committees, work-based learning activities such as internships and undergraduate research opportunities, and job placement support for graduates and industry partners. Dr. Tetteh co-authored the conference paper for ASEE.

Funding Support: None

International Collaboration: No

International Travel: No

What other organizations have been involved as partners?

Nothing to report.

What other collaborators or contacts have been involved?

Project participants during the reporting period have included Dr. David Spang (Principal Investigator) and Dr. Tetteh (Co-Principal Investigator) as leaders of the project. Additional participants have included 6-10 faculty involved in the applications library development and advisory committee meetings, 6-10 industrial advisory committee members from industry, and approximately 10 project team members, including grants personnel, who meet on a biweekly basis. Approximately 3-6 students have been involved with the project through advisory committee activities as well.

Additionally, 3-6 faculty and administrators, including the dean of the College of Engineering, from RU have been involved in the MET and EET curriculum development and approval process.

Finally, 59 participants attended a technology conference held at RCBC in July 2017.

Some additional key participants are listed below:

Leah Arter, RCBC, Business Development Administrator-serves as support personnel and leverages project support in the Workforce Development Institute, including participating in industry partnerships, facilities, and equipment. She supports coordination of partnerships with secondary schools.

Dan Sullivan-RCBC-NSF Project Manager-handles the programmatic, administrative and support functions for this project.

Elaine Young-RCBC-Project Coordinator

Dr. Nicole Scott-RCBC-Director of Educational Program & Grant Development

Eileen Swiatkowski-RCBC- Grants Specialist

Kathryn Strang-RCBC-Director of Compliance, Assessment & Research

Impacts

What is the impact on the development of the principal discipline(s) of the project?

During the reporting period, the impacts of the project have had farther reaching implications beyond the initially stated Goals and Objectives. While the Goals and Objectives supporting the creation of new curriculum have been met, the broader impact to the accessible “3+1” pathway and the creation of a new Engineering Technology department at RU are significant.

Furthermore, the creation of a robust industrial advisory committee in support of the new programs has had a farther reaching impact which includes support for RCBC’s STEM division in a variety of ways, and the inclusion of networking and cybersecurity as a program of interest to industry partners.

Finally, the interest and excitement focused on the new engineering technology program has had a positive impact on the STEM division and RCBC overall, through collaboration between faculty and staff, as well as through an increased focus on the importance of technical and non-technical skills.

What is the impact on other disciplines?

The activities and accomplishments of the project focused on MET have been extended to have a positive impact on the EET discipline at both RCBC and RU.

What is the impact on the development of human resources?

The program focus on soft skills will enable graduates to be better prepared to contribute to all aspects of an employers operations.

What is the impact on physical resources that form infrastructure?

The project has made a positive impact on the allocation of institutional resources at RCBC. RCBC has committed existing space and available funding to create laboratory and classroom space in support of the new MET program.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

Nothing to report.

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

It is expected that the outcomes of the project will enable graduates to think critically in all aspects of their lives, including technical and non-technical areas, and better understand the integration between these two often disparate functions.

Changes/Problems

Changes in approach and reason for change

A noted change to the project leadership team is that Dr. Eric Constans is no longer an Associate Professor at Rowan University, as has thus transitioned from serving as a Co-Principal Investigator of the project. Another RU representative, either administrator or faculty, will be identified and formally added as a member of the project team.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.

Special Requirements

Responses to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.

Nothing to report.