

STEPWork 2016

NSF Project

Abstracts



Participant: Marilyn Barger

University/College: Hillsborough Community College

Project Title:

FLATE: Florida's Advanced Technological Education Center of Excellence

Abstract:

The Florida Advanced Technological Education (FLATE) Center is a statewide ATE Regional Center for Advanced Technological Education that supports manufacturing and its related technology sectors. This project includes three goals as an extension and expansion of FLATE's efforts to: implement a statewide unified education system for manufacturing so that manufacturing education is a convergent curriculum that optimizes technician preparation; provide an effective outreach platform for high school, community college, industry, and legislature access, providing information about the requirement for and impact of manufacturing education in Florida; and present professional development opportunities for STEM educators to develop, refine, and certify their knowledge within manufacturing and its enabling technologies. Intellectual Merit: FLATE's focus is on three important areas: (i) Curriculum: The Associate of Science (A.S.) degree in Engineering Technology has integrated the national MSSC-CPT certification and the Manufacturing Skills Standards Council Certified Production Technician credential. This represents the first statewide articulation for a national industry credential. (ii) Professional Development: The Engineering Technology Forum is an exemplary model for collaborative professional development. The Forum meets at different Florida State and Community Colleges with a flexible agenda that meets a variety of needs within the College system. (iii) Outreach: The Made in Florida campaign is FLATE's award-winning dissemination platform that uses as its public information window www.madeinflorida.org. Made in Florida is a comprehensive combination of industry tours, videos, STEM student/teacher summer camps, career pathways, recognition awards, student-focused web site, outreach/dissemination events, FLATE FOCUS (a monthly newsletter), and statewide advertorials that are all partially supported by Florida industry. Broader Impacts: FLATE makes a significant impact on the broader aspects of technical education in Florida. It has developed a method for filtering course, certificate, and degree program content that the Florida Department of Education has delegated to FLATE to apply to new Engineering Technology- based program submissions. FLATE has demonstrated an effective way for community colleges to work directly with Workforce Florida - supported Banner Centers in order to optimize technical workforce education and training efforts statewide. It has included the Manufacturers Association of Florida in an awareness campaign that is instrumental in elevating manufacturing careers as necessary for Florida's economic well being. It has also created a pathway to the ET A.S. Degree program that allows high school students to earn 15 credit hours toward the A.S. Degree.

Participant: David Julian

University/College: University of Florida

Project Title:

The Bioscience Scholars Program: Bringing the Master's Degree Within Reach

Abstract:

The intellectual merit of this project, Bioscience Scholars (BioS) at the University of Florida, stems from its goal of bringing a thesis-based BS/MS program within reach of low-income students, making the scientific profession and its community accessible to them and allowing them to achieve their maximum potential. The project targets students in a statewide high school biotechnology program who have already demonstrated an interest in biotechnology and acquired substantial technical skills, but lack the financial resources to complete a graduate degree. Scholars are provided coursework and workshops focused on foundational knowledge, critical thinking skills and technical skills, and are given the opportunity for extensive, mentored research experience. The BioS program leverages an institutional commitment so that scholars graduate with a combined BS/MS degree within five years. Broader impacts include curricular reforms that affect all biology students at the University of Florida, not just the scholars. This program could serve as a national model of creating diversity because the targeted population from which students are recruited includes many underrepresented minority students. Finally, students in this program are trained to fill local needs in the job market in Florida's rapidly growing biotechnology sector.

Participant: Becky Mercer

University/College: Palm Beach State College

Project Title:

InnovATE

Abstract

The goal of the InnovATE (Advanced Technical Education) project is to increase graduates in STEM disciplines, particularly underrepresented minorities and women, in response to demand for local, highly-skilled workforce needs in the power, aerospace, and manufacturing industries. Synergistic programs are increasing awareness of STEM in middle through high schools, strengthening math skills, and developing a pathway for pursuit of associate and baccalaureate high-tech degrees. Specific programs include: a STEM outreach program impacting 1680 middle and secondary students; a summer program for incoming students to complete the MSSC Certified Production Technician (CPT) training earning 15 college credit-hours; a contextualized Intermediate Algebra gateway course to improve math skills proficiency; intensive academic support through math/science Supplemental Instruction; and articulation agreements to baccalaureate degrees. Intellectual merit drivers of InnovATE are aligned with rigorous assessments to advance understanding of which tools and strategies aid successful completion of associate degrees in Electrical Power and Engineering Technologies. This includes developing assessment tools and activities for identifying key factors influencing enrollment in STEM programs, establishing instructional supports needed in Mathematics, studying the influence of mentors and industry partners have on students to induce willingness to succeed, and evaluating learning strategies to advance discovery of how STEM technicians learn, study, and train. InnovATE will address the need to diversify the STEM workforce by targeting Title I schools as the primary pipeline for students from underrepresented groups enrolling in the college to advance desired economic and societal outcomes. In addition, InnovATE's broader impacts will provide a transferable model to increase students pursuing degrees to join a highly-qualified STEM workforce.

Participant: Emre Selvi

University/College: Jacksonville University

Project Title:

Mathematics, Engineering, & Physics Scholars

Abstract

The Mathematics, Engineering, and Physics (MEP) Scholars program at Jacksonville University is contributing well-prepared individuals to the science, technology, engineering, and mathematics (STEM) workforce by providing an educational experience that emphasizes student discovery. This program is designed to increase enrollment of students, including those from underrepresented groups, and improve retention of scholars through graduation or transfer to an affiliated institution in engineering-related disciplines. The project can serve as a model for similar institutions, particularly those that utilize a 3 + 2 program with affiliated universities for students to earn an engineering degree. The project is recruiting annual cohorts of students based on academic ability and financial need and supporting them by the development of a Residential Learning Community (RLC), faculty mentors, tutoring, peer study groups, college survival skills training, and career development. The program is collecting information on how an RLC works as well as how the systemic implementation of the numerous support structures impacts the retention and graduation of STEM majors. Women and underrepresented minorities are being targeted in recruitment and retained via the social and academic support structures of an RLC. The program is being assessed based on enrollment, mid-term and final grades, attendance at extracurricular functions, career plans, resiliency, engagement of faculty and students, learning motivation, and learning strategies. Outcomes and knowledge gained are being broadly disseminated. The participation by scholars in project-based courses, mathematical modeling contests, and enrollment in paired courses enables them to discover the connections between physics and mathematics. The scholars are being encouraged to participate in an annual mathematical modeling competition, undergraduate research, and internships with local government and industry partners. Support structures are scheduled within the targeted majors to deliver maximum impact to each student and to equip each student to succeed. Mentoring provides feedback and guidance and grounds students in their chosen disciplines. Undergraduate research, internships, and career development solidifies their learning and prepares them professionally. To ensure best practices in STEM teaching, a Learning Community (LC) is being created for the MEP faculty and tutors. Faculty and tutors are participating in workshops and regular meetings to discuss best practices in STEM education, teaching strategies, and the progress of the program.

Participant: Massood Towhidnejad

University/College: Embry-Riddle Aeronautical University

Project Title:

S-STEM: Encouraging students to pursue an engineering education and career

Abstract

Software Engineering (34) The Embry-Riddle Aeronautical University College of Engineering S-STEM program is providing thirteen \$10,000 scholarships to students in computer science and in computer, mechanical, software and electrical engineering. Students participating in the program are being provided with one-on-one advising, participation opportunities in interdisciplinary real-world engineering projects, internship opportunities, and research assistance and educational support for their research project. Additionally, participants are receiving all of the benefits of the school's pre-existing career services department, including access to job fairs, interview preparation, resume development assistance, and direct connections to industry recruiters.

Participant: Will Tyson

University/College: University of South Florida

Project Title:

PathTech LIFE: Constructing a National Survey of Engineering Technology Students through Regional and Statewide Testing

Abstract

PathTech LIFE is a national survey of LIFE (Learning, Interests, Family, and Employment) experiences influencing pathways into advanced technology programs at two-year colleges. The purpose of this survey is to determine how student pathways, career goals, and school-work-life balance influence program recruitment and retention. Because a large majority of participants are expected to be adults with numerous and complex life challenges (i.e., family, personal, school, and work), an investigation into their lived experiences is necessary to inform institutional efforts to support their success. Survey participants will include individuals completing coursework, certification, and AS/AAS degrees in engineering technologies, advanced manufacturing technologies, micro and nano technologies, and energy and environmental technologies at 35 institutions.

PathTech LIFE is the second stage of a partially mixed-methods sequential equal-status research design that builds upon explanatory models developed during the qualitative initial phase of the research design (“Successful Academic and Employment Pathways in Advanced Technologies” #1104214). The survey instrument is also based on the PRISM Decision Model for Adult Enrollment (Pathway to better life; Reflective learner; Synchronizing learning, earning, and living; Match with an academic life) and Schlossberg's Transition Theory.

Participant: Kurt Winkelmann

University/College: Florida Institute of Technology

Project Title:

Evaluating Students' Learning and Attitudes in a Virtual Chemistry Laboratory

Abstract

The project is investigating the benefits of students performing simulated chemistry laboratory experiments in the 3D immersive virtual world of Second Life. Researchers at Florida Institute of Technology are creating the environment and the virtual laboratories which are realistic, fully interactive simulations of their real world analogues. The project is engaging multiple sections of students enrolled in General Chemistry 1 Laboratory at Texas A&M University to complete several weeks of lab activities in Second Life to complement the remainder of their lab course experiences which are traditional. Other sections of students will conduct only traditional laboratory experiences. The two sections are completing identical or nearly identical experiences whether in the traditional lab or the virtual environment. The investigators are answering two research questions: (i) How does the traditional or virtual laboratory environment affect students' ability to achieve the learning goals of the laboratory experiment, including knowledge and kinesthetic skills? (ii) How does the laboratory environment affect students' attitudes towards learning chemistry in the laboratory and performing laboratory work? This project is providing understanding of students' attitudes and content knowledge of general chemistry laboratory activities performed in a traditional manner as compared to that performed in an online virtual world that also embraces social interactions. By the use of an on-line practicum, offered to all students regardless of the learning cohort in which they participated, the project is measuring students' gains in kinesthetic (hands-on) laboratory skills. Prior research suggests that virtual laboratory experiences lead to more favorable opinions of chemistry by students, and to better academic performance. Verification of this outcome can have a transformative effect on the way introductory chemistry laboratories are taught. With challenged budgets and expanding populations, other institutions of higher education may be interested in adapting the Virtual Laboratory approach into their own curriculum. Results from this project could help improve the outcomes of on-line and distance education approaches. The virtual laboratory with its integrated social aspects, is providing more students, and students of underrepresented groups, with access to high quality laboratory education.