‘Supporting the STEM Career Pipeline FROM PRESCHOOL TO GRADUATE SCHOOL’
Hoots and hollers of excitement filled the room as Fresno State students demonstrated the laws of physics to Alicia Clark’s preschool class at Clovis’ Century Elementary School by levitating a beach ball with a leaf blower. It’s all part of Fresno State’s Physics 168S service-learning course aimed at increasing interest in future science, technology, engineering and math (STEM) students to fill the growing demand.

“What better way to interest future STEM students than making science fun and achievable?” says Fresno State Physics professor Don Williams. “Our best bet at increasing the amount of STEM graduates and occupations is to teach people not to be intimidated by (science).”

Williams’ Physics 168S course engages students through hands-on learning and live demonstrations at local pre-K through high schools to generate interest in STEM careers.

“What makes this course different is that you do not have to be a science major to take it — it is open to all,” Williams says. “In fact, most of my students now are liberal studies majors wanting to become teachers with a concentration in STEM.”

The Mathematics and Science Teacher Initiative (MSTI) is a California State University system-wide effort to increase mathematics and science teaching credentials at each of the CSU campuses to help meet the state’s continued need for fully credentialed middle and high school teachers.

The number of single-subject mathematics and science teaching credentials awarded at Fresno State has increased from 25 in 2006, when MSTI was first funded, to more than 90 in 2013, says Dr. Carol Fry Bohlin, Fresno State mathematics education professor, director of Mathematics and Science Teacher Initiative and special assistant to the provost for STEM initiatives.

A Department of Commerce 2012 report found that demand for STEM occupations grew three times faster than non-STEM occupations in the past 10 years. STEM occupations are projected to grow by 17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.

“Fresno State is committed to its role as a highly engaged and collaborative leader in STEM education, supporting the STEM career pipeline from preschool to graduate school,” Bohlin says. “The growth we have seen these past few years is just remarkable — and a lot of that has to do with William’s vision and passion for his students.”

First-year physics student Sarah Kroeker says her favorite part of the class is seeing the reactions of the younger students first hand. “Professor Williams always says that no matter our age, major or experience, every one of us will walk out of this class feeling confident in what we have learned and be able to teach it,” Kroeker says. “And after seeing the impact we have made on these kids, I believe it.”

In fall 2013, the class visited 40 different schools: 20 elementary schools, four middle schools, eight high schools, two colleges and six private/charter schools in 11 school districts — Chawanakee, Clovis, Cutler-Orosi Joint, Fowler, Fresno, Madera, Hanford, Island Union Elementary, Merced, Sanger and Selma — plus Children’s Hospital of Central California.

Graduate physics student Max Bright has been a part of the program since it began in 2012 with just two faculty members, four graduate and one undergrad physics student. Today, the class has more than 20 students from various majors.

“The growth of the course has been remarkable,” Bright says. “Having more students allows for more opportunities to share the fun and beauty of science with those in the community.”

Chris Fiorentino, director of Fresno State’s Jan & Bud Richter Center for Community Engagement and Service-Learning, says, “This course is responsible for an incredible contribution to campus outreach and recruitment efforts in STEM concentrations. The Fresno State students involved in this project repeatedly indicate what a positive service-learning experience this has been for them and how it has increased their knowledge and the motivation of many STEM students to go into pre-K-12 science education.”

Not only does Physics 168S instill confidence in students, Bright says he also notices a newfound confidence in teachers at the schools they visit. “Seeing the students teach physics principles and concepts to their class reassures teachers that they can teach science too, and that is what we want to teach STEM students.”

“On my path to teaching physics, I have found the STEM concentration courses have offered me tools and techniques that I will use in my classroom,” Bright says. “For the students that take the course, it offers a fantastic opportunity to go to schools, teach science, gain courage in speaking and teaching and just have a lot of fun.”

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