

Jonathan Gaines Receives NSF Award

TAMPA, FLA. (March 2018) – Department of Mechanical Engineering Instructor II, Dr. Jonathan Gaines in collaboration with Dr. Tonisha Lane and Dr. Eugenia Vomvoridi-Ivanovic of the College of Education received a new award from the National Science Foundation Broadening Participation in Engineering Program. This project entitled “Engineering Youth Experience Promoting Relationships, Identity Development, and Empowerment (EYE-PRIDE) was awarded January 1st, 2018.

EYE PRIDE is a 3 year longitudinal study of the Bulls-EYE Mentoring program at the University of South Florida (USF). The program considers engineering identity theory to examine the nexus between the engineering design process and literature on culturally responsive learning and mentoring. As a result, activities are expected to be particularly relevant for broadening participation of black and Hispanic youth in underserved populations. The program curriculum consists of two intervention programs administered as 6-week summer engineering academies: The first, Bulls-EYE Robotics, was created and piloted during the 2014-2015 academic year to target rising 7th graders with a focus on mechatronics and interpersonal skill development and the second, Bulls-EYE Environment, was created and piloted during the 2015-2016 academic year to target rising 8th graders with a focus on environmental engineering, earth science, and community development. The effects of the program on engineering identity and development of engineering skills of the following populations will be measured using a mixed methods approach

1. **Mentees:** Underrepresented minority (URM) middle schoolers from the surrounding area of USF that participate in Bulls-EYE Robotics and/or Bulls-EYE Environment as 6th, 7th, and/or 8th graders;
2. **Engineering Mentors:** Undergraduate students that participate in the program in the early years of advancement in their engineering program in need of leadership development experience;
3. **NMST Mentors:** URM Novice Math or Science Teachers that participate as experienced pre-service teachers or early in-service teachers with a need for professional development experience.

The summer engineering academies first administer a 16-hour training to Engineering Mentors and NMST Mentors on culturally responsive teaching to facilitate both interventions. Each mentor is then matched with two mentees for project work applying the program’s novel Plan, History, Act, Shift, Evaluate, Success (PHASES) design process. PHASES uses topic-chaining of Next Generation Science Standards to learn engineering design and introduce life skills and technical skills concurrently. Topic chaining in the culturally responsive learning literature (Gay, 2010) emphasizes the need to develop connections in three primary ways so learning is culturally relevant: 1. traditional scaffolding to build upon simpler ideas, 2. storytelling through a shared, interconnected narrative, and 3. relevance to the practical realities of participants. PHASES starts with a simple design process with few steps and adds to it, using scaffolding and a shared



narrative to advance learning as youth build relationships and become comfortable with learned skills. After interventions are completed, the program continues the mentor/mentee relationship and assesses skill development and engineering identity growth in relation to comparable peers not receiving interventions. The program will reach 120 URM Mentees, 45 Engineering Mentors, and 15 NMST Mentors while adding a research component, program evaluator, and advisory board for its curricula and training program to be implemented with fidelity. This lends itself to future program expansion to other state institutions with large URM populations and the dissemination of findings towards a national model. Longitudinal research studies of the engineering pipeline that provide insight into vital populations are useful for better understanding of structural inequalities and biases.

More information about the program can be found at <http://bullseye.eng.usf.edu>

