What Makes The Difference – for Underepresented Students Staying in STEM Majors

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Abstract

The underrepresentation of certain minority groups in science, technology, engineering, and mathematics (STEM) fields continues to be a pressing concern. While this issue has many root causes, the low retention and graduation rates of underrepresented minority (URM) students in undergraduate STEM majors – particularly at predominantly white research institutions – serves as a significant contributor to the problem. To address this, postsecondary institutions often establish STEM Intervention Programs (SIPs) intended to improve the outcomes of URM students interested in pursuing STEM-related degrees. While SIPs have shown varying degrees of success in improving academic achievement and graduation rates, there remains a recognized need to better understand how such programs personally impact the targeted students.

This work seeks to identify ways in which the SIPs at an urban public research institution affect URM student perceptions of academic integration, social integration, and career preparation. The institution hosts a number of SIPs, including transition programs, research experiences, peer mentoring, scholarship programs, etc. The work employs an emergent mixed-methods design. Surveys, focus groups, interviews, and academic monitoring have been used begin to understand the degree to which SIPs have influenced students' perceptions of issues deemed crucial to academic success.

The institution at which this study is conducted is home to 14 undergraduate STEM degree programs, in which approximately 5,000 students are enrolled. In the 2012-13 academic year, 19.3% of all undergraduate degrees conferred by the institution went to STEM majors. The institution has a large and diverse population of students enrolled in STEM majors, including many first-generation college students and many students from URM groups (24.2%).

Biographies

Dr. Rosalyn Hobson Hargraves holds a joint appointment in the Schools of Education and Engineering as Associate Professor of Teaching and Learning and Associate Professor of Electrical Engineering at Virginia Commonwealth University. She received her B.S., M.S., and Ph.D. degrees in Electrical Engineering from the University of Virginia. Her research interests are in STEM education, biomedical signal and image processing, and machine

learning. She has been awarded the Dominion Strong Men & Women Excellence in Leadership Award, Richmond Joint Engineers Council Engineer of the Year, AAAS Diplomacy Fellowship, and the NSBE Janice Lumpkin Educator of the Year Award.

Dr. Waller is currently a Postdoctoral Fellow in the Department of Teaching and Learning, School of Education at Virginia Commonwealth University. She received her B.S. degree in Biology with a minor in Chemistry from Chowan University and a Ph.D. degree in Genetics Bioinformatics and Computational Biology from Virginia Tech. Dr. Waller is interested in utilizing innovative technologies and biological sciences to provide direct support for underserved communities and improve K-20 STEM education initiatives. Dr. Waller was recently inducted into the Chowan University Hall of Fame. She has been awarded the Women in Leadership Award, Transdisciplinary Team Science Award, Chowan University Young Alumni Award, and Virginia Tech Graduate Woman of the Year Award

Mrs. Brinkley received a B.S. degree in Chemical Engineering from the University of Virginia and her M.S. degree in Chemical and Life Science Engineering (CLSE) from Virginia Commonwealth University. She was awarded an Outstanding Teaching Assistant Award and a GANN fellowship at VCU. As a doctoral student developed and taught a new CLSE course for freshmen CLSE majors. Her research interest include STEM education and the development and application of new technologies that will streamline oranganic synthesis through process intensification.

Mr. Falcon Rankins received B.S. and M.S. degrees in Aerospace Engineering from the University of Maryland, College Park. During his graduate school tenure in engineering, Mr. Rankins developed a 6-degree of freedom aerospace trajectory simulation code that incorporated neural network meta-modeling and evolutionary algorithm-based optimization techniques. In Fall of 2013, Mr. Rankins enrolled in the Virginia Commonwealth University School of Education, where he is currently pursuing a Ph.D. in Educational Research and Evaluation with an interest in access and retention issues for underrepresented minorities and women in STEM