SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Lift Off - Secondary Space Education (2)

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ASTRONOMY IMMERSION AND K-12 EDUCATION: A CRUCIAL LINK IN INSPIRING UNDERREPRESENTED STUDENTS TO EXCEL IN STEM EDUCATION THROUGH INNOVATIVE INSTRUCTION, STAKEHOLDER PARTNERSHIPS AND IMMERSIVE ASTRONOMY RESEARCH

Abstract

As we prepare our K-12 students for a global workforce, it is essential to provide culturally responsive education and equitable access for all students. A conceptual framework based on three foundational elements provides the scaffolding to engage underrepresented students in astronomy education. 1. Authentic science, technology, engineering, and math (STEM) research and immersive learning must begin early. President Barack Obama's recommendation to Congress for the reauthorization of the Elementary and Secondary Education Act (ESEA) includes a focus on fostering innovation and excellence. Examples of innovative programs include the NASA Explorer School program, Subaru Telescope Educational Outreach program, Spitzer Space Telescope program, and Wide Field Infrared Survey Explorer student research program. These programs provide astronomy experiences to students who might otherwise not have access or might be traditionally disengaged. Research also supports the inclusion of authentic research into early learning. Students who begin their STEM immersion in middle school are prepared to select appropriate high school and college course work. This is especially appropriate for students who may not come from families who are comfortable navigating the educational system. 2. Partnerships between STEM education and family, community, the Aerospace industry, policy-makers, and business provide career connections and real-life models for students. Partnerships provide STEM mentors for underrepresented groups and also serve to strengthen scientific literacy and support from the stakeholder communities. 3.Accomplished teachers are crucial for fostering academic excellence. In-depth studies of teachers demonstrate consistently higher levels of achievement when a National Board Certified teacher is the instructor. The correlation to higher student achievement is also stronger when the teacher has engaged in increased scientific research herself. In addition, when teachers are trained to embed culturally responsive teaching into their classrooms and use a motivational framework for engagement, students from poverty, female students, and minorities are more engaged and have the opportunity to achieve

at a higher level. Qualitative and quantitative data indicates that these three foundational components improve teacher effectiveness, student achievement, student motivation, and access to STEM careers and opportunities for underrepresented students. Data collection includes an analysis of standardized test scores (comparing at-risk classrooms that incorporated astronomy immersion with classes that did not), teacher surveys, NASA Explorer School pre and post studies, national teacher effectiveness studies, and student feedback. All sources of data indicate a strong correlation between the implementation of the described conceptual framework and student success.