Community/Public Service Worksheet

Service Category: Educational Outreach Programs

Title: Rockets and Racecars

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Program Description: Rockets and Racecars is a hands-on activity that shows middle school students ways that math and science can be used to solve real-world problems. Students are introduced to model Racecars and model rockets and relate design differences to fundamental concepts that they are learning in the classroom, such as fractions, measurement, velocity, etc. The projects are implemented in a competition framework in a similar manner as collegiate design competitions like Formula SAE, NASA Student Launch Initiative, ASME Human Powered Vehicle Challenge, etc. Rockets and Racecars also sponsors Senior Design projects in the UA College of Engineering to develop new technology. Last, program development is accomplished via a new course, Engagement Scholarship for Scientists and Engineers. Rockets and Racecars grows with its participants (up to 12th grade) and follows school feeder patterns in order to facilitate long-term assessment of the effectiveness of the program on the children we serve.

Objectives/Outcomes: Generate interest in STEM disciplines among children of underrepresented populations. We seek students that consider science and engineering to be fields "for other people". We want to show that not only are STEM degrees attainable, they can be a great deal of fun. One of our primary goals is to answer the question "what good is this stuff I'm learning?" As Rockets and Racecars grows, we will begin internships in UA research laboratories for top participants in 2018, the summer after their 10th grade years. In 2020, we will award full 4-yr scholarships to UA or tuition grants equal to UA in-state tuition for students that choose to

Assessment Measures: We will be implementing qualitative and quantitative assessment beginning in Fall '14, working in concert with partners in the UA College of Education. That phase of our work will also facilitate research regarding the effects of immersive projects on student engagement. One of our partners in The office of Community Affairs intends to use this research as the basis of his doctoral thesis.

Results: No formal results yet because we have no IRB approval in place. However, the best endorsement we have received so far came from a fifth grader: "Until Rockets and Racecars, I never knew little girls could grow up to be engineers."

Conclusions: Rockets and Racecars follows a formula proven to work in collegiate settings, only adapted for younger audiences. It's early success has been phenomenal, but there is much more work
to be done. Anecdotal evidence is that the students benefit from expansion of their skillsets and much growth in their confidence in their math and science abilities.

Improvement Actions: (1) Implement formal assessments. (2) Implement a summer R&R Teachers Academy (with CEU credits) at UA to train teachers in R&R curriculum. They can then deliver it to their students and return in successive summers where we hold resident R&R competitions on campus. This will allow maximum dissemination of the R&R concepts and let student contestants tour the science and engineering facilities at UA while participating in workshops to help hone their skills. (3) Secure more funding. We have a proposal under review for the NSF ITEST program. (4) Secure local funding by helping schools develop sponsorship packages for entities such as the Chamber of Commerce, local churches, Adpot-a-School companies, etc.