

STUDENT TEACHER ASTRONOMY RESOURCE (STAR) PROGRAM: INSPIRING THE IMAGINATION OF FLORIDA CITIZENS. M. Gaboardi¹, M. Humayun¹, and P. Dixon², ¹Department of Geological Sciences and National High Magnetic Field Laboratory (NHMFL), Florida State University (FSU), 1800 E. Paul Dirac Drive, Tallahassee, FL 32310 (gaboardi@gly.fsu.edu), ²Center for Integrating Research and Learning, NHMFL, FSU, 1800 E. Paul Dirac Drive, Tallahassee, FL 32310.

Introduction: Florida is ensconced in the public imagination as the launch site for many of our space missions (including both the Genesis and Stardust Missions), but space science education is not well represented in Florida public schools. Our NASA-funded E/PO program, the Student-Teacher Astronomy Resource (STAR) Program, designed around the Stardust and Genesis Missions, focuses on the reciprocal relationship between technological progress and advances in scientific understanding. We work directly with the public, teachers, classrooms, and individual school students. Both formal and informal evaluations suggest that our four-step approach to outreach was effective during the 2005-2006 school year. Modifications to our program in 2006-2007 include the collaboration with a primary school teacher, adaptation and inclusion of a wider range of curricula, and more frequent teacher workshops reaching a greater number of teachers. This annual program may serve as a model for the partnership between a national research institution (NHMFL), local scientists, and local teachers in Florida.

Components: Based on the needs of our local school district, we have created and begun to implement the STAR program, of which there are four annual components. Outreach in components 1, 3, and 4 is engaging, informal, and has been developed around the Science Teaching Standards as outlined in the NRC's National Science Education Standards [1]. The more formal component 2 includes both curricula modified from the NASA website and curricula developed by our collaborating primary school teacher. All components of this program meet NRC Program Standards B, D, and E. We focus on timely NASA missions in an inquiry-based format, provide access to materials and the scientific community, and this access is available to all schools in Leon County (FL).

1. Reaching the community. Three interactive "Space Stations," developed around the technology and science of the Genesis and Stardust Missions, are offered as child-friendly booths at the National High Magnetic Field Laboratory (NHMFL) Open House, an annual event that attracts over 3000 visitors from Tallahassee and the surrounding areas in Leon, Wakulla, Gadsden, and Jefferson counties. "Build-A-Comet," based on our "Comet Tales" unit, allows children to explore the composition and structure of a comet.

Children help create a comet model, which they compare to the composite image of Wild 2. "Catch This: NASA Technology" features aerogel and Genesis high-purity wafers, both were received with excitement by children and adults in 2006. "Prepare to Land" is an interactive exhibit in which children design a spacecraft to test on several "alien" surfaces. Based on popularity, the 2006 stations were chosen to display for VIP guests visiting the NHMFL and were featured in local television, radio, and print media coverage. The stations are staffed by faculty and graduate students of the Geochemistry group and allow for direct interaction between the scientists and the public (Figure 1).



Figure 1. Humayun creates a model of a comet (foreground) for onlookers at the 2006 NHMFL Open House at the "Build-a-Comet" station. The other two "Space Stations" are seen in the background.

2. Resources for teachers. In spring 2006, we held a one-day in-service at the NHMFL, during which 15 fifth- through ninth-grade teachers were given materials and curricula necessary to complete "Technology for Studying Comets" with their students [2]. Teachers worked cooperatively, creating collection devices appropriate for use in a Stardust-like mission, and workshoping how to best present this material to their students. These 15 teachers then brought to their students an inquiry based space science unit about which they were knowledgeable and excited. Schools were targeted for participation based on their Title I designation, as defined by the US Department of Education and the State of Florida, based on meeting the needs of low-achieving children in schools "in which poor children make up at least 40 percent of enrollment [3]." In 2006 we received, and accepted, applications for participation from 3 teachers from Title I schools.

Teacher response was largely positive. Suggestions included curricula modification and more flexible workshop times and locations. Based on these responses and our desire to attract more participation from Title I schools, we collaborated with a primary school teacher, Marcy Steele, to modify existing and create new curricula. In the summer of 2006, Steele created “The Solar System: To the Planets, Comets, and Beyond!” This unit is appropriate for grades 1-5, is undergoing initial, informal classroom testing, and is available on our website [4]. In 2006-2007 we are offering three workshops to teachers which include both NASA’s and Steele’s curricula. Workshops last two hours and are held at local Title I public schools.

During summer 2007, based on teacher feedback, Steele, Gaboardi, and Dixon will modify “Technology for Studying Comets,” that we may again offer workshops for teachers of grades 6-9.

3. *Outreach to classrooms.* We offer “Comet Tales,” an informal education experience based on the NASA classroom activity “Comet Basics,” to local classrooms [5]. In 2006, Gaboardi visited 15 local classrooms and engaged students with inquiry about comets, sampling of Wild 2, and what scientists hope to learn from the Stardust Mission (Figure 2). Visits occurred during the two-week “Technology for Studying Comets” unit, taught by each STAR teacher, and served to generate excitement and increase content knowledge among students. Based on strongly positive student and teacher response, this component will continue to be offered to local classrooms by the Center for Integrating Research and Learning at the NHMFL.



Figure 2. Gaboardi demonstrating content at Florida State University High School, Leon County (FL).

4. *Student involvement days.* “STAR Students” is an informal science education experience that seeks to draw high-performing students of all backgrounds into the research laboratory environment. Teachers participating in Component 2 each chose one student to represent his/her classroom at the NHMFL for a day. Actual research experiences depended on the grade level of the student, with complexity increasing according to

grade. In 2006, the 15 visiting students were exposed to the inner-workings of a national research facility (NHMFL), research opportunities available to NASA scientists (e.g., Figure 3), and direct interaction with the PI and his research group. Students were invited to share these experiences with their families and teachers through a short PowerPoint™ presentation at the end of their daylong visit, with their parents and teachers attending. The presentation included highlights of the students’ day and basic information about the Stardust



Figure 3. A STAR Student from Pineview Elementary school, Leon County (FL), inspects a mass spectrometer.

and Genesis Missions. These visits not only impacted the 15 students involved, but served to expand their parents’ and teachers’ understanding of what constitutes education and scientific research, and what NASA contributes to both. All responses were overwhelmingly positive. The STAR Students component will continue in 2007.

Outcomes: Our research group’s participation in the NASA Genesis and Stardust Missions has appeared repeatedly on local television (WCTV-Channel 27), on radio (WFSU, Florida Public Radio, NPR *Weekend Edition*), and in local newspaper articles (*The Tallahassee Democrat*). We have received strongly positive teacher, student, and parent response. Additional formal evaluation, planned for spring 2007, will assess the degree to which teachers from the previous year continue to use curricula provided. Based on informal responses, we expect to see a continued, positive impact from our program in local classrooms and in our community.

References:

- [1] NRC (1996) NSES. [2] <http://stardust1.jpl.nasa.gov/classroom/activities/6-stardst-ch05.pdf>. [3] US Dept. of Ed. (2006) Title I, Part A, Program at a Glance. [4] <http://education.magnet.fsu.edu/education/teachers/resources/stars>. [5] <http://stardust1.jpl.nasa.gov/classroom/activities/2-stardst-ch02.pdf>.