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**TECHNOLOGY PARTNERS TAKE ASD STUDENTS
ON AN “OUT OF THIS WORLD” EXPERIENCE**

(Allentown, PA) February 21, 2005 – Allentown School District’s Harrison-Morton Middle School (HMMS) is participating in rare, cutting edge technology through a collaborative partnership made possible by a National Science Foundation G K-12 STEM (science, technology, engineering, and mathematics) Grant, Lehigh University, and generous local sponsors. The program will include an interactive model of the Martian Landscape being built in the school; students are already learning to use the robots that will serve as an exploratory tool for the planet’s surface.

PARTNERSHIP

The partnership started when the Lehigh University team of Dr. William M. Pottenger, Assistant Professor of Computer Science & Engineering and Principal Investigator on the STEM project, and

Dr. Henry Odi, Executive Director of Academic Outreach & Government Affairs, successfully applied for the NSF G K-12 Grant in June 2003. The grant runs through May 2006 with the total value estimated at \$500,000 for technology and personnel over this three-year period. Pottenger and Odi's proposal included using grant resources to increase interest in the STEM subjects in women and urban populations. Lehigh University is reaching out to schools in Bethlehem and Allentown for participation in the program, including ASD's Harrison-Morton Middle School and Dieruff High School.

"We're excited about the many academic opportunities that this grant and the partnership affords our students," explains Dr. John A. McAdams, Assistant Superintendent of Curriculum and Instruction for Allentown School District. "This partnership will help us not only increase student achievement, but give our students an in-depth understanding of mathematics and science in order to be prepared for careers and citizenship in the 21st century."

The grant calls for a technology team (consisting of a faculty team leader, graduate student, and undergraduate student from Lehigh University joining with teachers from the school, and industry representatives) to lead the integration and development of the technology and curriculum. Dr. Pottenger leads the technology team at HMMS; HMMS computer literacy teacher, Donald Stahl; graduate student fellow Jesse Wolfgang; and undergraduate student Steve Zanias join Pottenger on the team. Through the recommendations and developments of the technology team, Lehigh University has purchased the robots and wireless internet infrastructure technology for HMMS. Lehigh initially purchased nine robots and HMMS purchased an additional six robots bringing the robot population at HMMS to fifteen at the close of the 2003-2004 school year.

The Martian Landscape and Mission Control Center at HMMS will be a unique addition to the school. Construction of the landscape is funded through grants provided by the National Science Foundation and the Pennsylvania Infrastructure Technology Alliance (PITA), a part of the Pennsylvania Department of Community and Economic Development. PITA is contributing \$55,000 toward the construction the landscape. Currently, a room in Harrison-Morton's basement has been allocated to house the landscape and the school principal has committed a classroom to serve as a home base where the students can remotely control their robots. Construction of the landscape will commence this summer with students from the Lehigh County Career and Technical Institute (LCTI) assisting. While the Martian Landscape and Mission Control Center are still in the planning stages, a website depicting these exciting developments can be found at:

www.allentownsd.org/HM/TechnologyLiteracy/MartianLandscape/index.htm
<http://hddi.cse.lehigh.edu/stem/>

PROJECT DESCRIPTION

Upon joining with Lehigh University and the corporate sponsors, ASD through HMMS launched this initiative to develop a district-wide middle-school technology education curriculum based on the success of the robotics program at Harrison-Morton taught during special summer classes. HMMS currently has fifteen robots in its building. Technology literacy teacher, Donald Stahl, had his 7th and 8th grade students build the robots upon their arrival. After construction of the robots, which carry a laptop computer from which they receive information and instructions, the students learn to program the robots to perform different functions. Because the robots operate over a wireless internet connection, students do not need to be in the Mission Control Center to operate them. The robots have a gripping arm, the ability to move in all directions, and two web cameras that display an image on the users' computer screen to assist in control.

Stahl says, "With fifteen robots available overall and five reserved specifically for students navigating the Martian Landscape, each student has the opportunity to learn in a cutting edge environment that integrates many subject skills in to a fun, enjoyable, and beneficial experience. From a computer in the Mission Control Center, or a computer in their classroom, students will be able to direct robots to pick up certain items, such as rocks or soil samples and 'bring it back to Earth' for research and experimental uses." "This is a key component of the philosophy behind the use of mobile robots: technology enables the learning of math and science," says NSF Project Co-Director Dr. Pottenger. All HMMS students and teachers and all ASD middle school classes will have access to the Martian Landscape and the robots.

Students already had some fun navigating the mobile robots through an obstacle course as part of a relay race and in a scavenger hunt (see www.lehigh.edu/STEM for video excerpts of the race). The experience helps students become more adept at programming and maneuvering the robots and prepares them for using the robots in the coming school year.

The William Allen High School art students and HMMS art club will paint Martian Landscape murals on the walls of the selected room. In addition to the realistic landscape of Mars in the room and on the walls, the room will be climate controlled and light controlled; students will be able to tangibly feel and see the span of a Martian day in a forty-five minute class period. Binney & Smith, Inc., makers of Crayola® crayons and founders of the Crayola® Factory in Easton, PA, have donated to HMMS an educational exhibit about Mars entitled, "Journey to the Red Planet." The display, which is no longer in use, exceeds 2,000 square feet of space.

EDUCATIONAL BENEFITS

The new Martian Landscape and robots are generating lots of excitement and enthusiasm at ASD. Bill Gibbard, ASD Curriculum Coordinator for the Sciences, says, “The Mars experience with the robotic partners is a fantastic addition to our science curriculum at HMMS and ASD. This experience adds to what our hard-working students and dedicated teachers already achieve, engaging students and teachers alike in new experiences to further what is already a strong science and technology curriculum.”

HMMS seventh and eighth graders are already seeing the educational benefits of the robots. Gibbard says, “The students are actively taking responsibility for the care, maintenance, and upgrades of the robots. Not only are our students learning cutting edge technology, they are eagerly learning the responsibility that comes with such opportunities.” Over the course of this school year, the seventh and eighth grade students had opportunities to program and use the robots in the classroom. One of their tasks involves measuring the lengths of the school’s various hallways and programming the robots to travel the halls. The goal for the students is to successfully program the robot to navigate the robot around the perimeter hallways of the school. Some of the groups were able to have the robot travel the several hundred foot path and stop within a few inches of their original starting location on their first try. The students also worked in teams to remotely control the robots to grasp, transport and weigh rock samples of various densities to learn how scientists work in teams and need to cooperate to stage a successful mission.

Students will also have the unique opportunity to study Mars and the solar system at the ASD planetarium at Dieruff High School in conjunction with the Martian landscape. HMMS principal, Burdette (Buddy) Chapel says, “Our school, and all of ASD, is proud to stand with Lehigh University, the NSF, Binney & Smith, Inc. and PITA to make HMMS home to such cutting edge technology. The educational opportunities for our students abound. Combined with the planetarium, the Martian Landscape and robots we have a level of technology and a learning experience that is very, very rare in middle schools. Our students deserve it.”

The robots will also be used in subjects outside the sciences and technology. Opportunities for integration with other subjects are numerous. Gibbard says, “With the wireless web cameras attached to the robots, students in an English class will be able to navigate through the virtual terrain of Mars to imagine what might be just over the horizon and write about it. Or, in math class, the students can measure the trajectory needed to launch a rocket, In government class, students

can explore how NASA is funded. Teachers already teaching the same subject matter in their classrooms now will have one more resource for ASD's students and teachers to forward our already strong curriculum."

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent federal agency that supports fundamental research and education across all fields of science and engineering, with an annual budget of nearly \$5.3 billion. The Foundation's G K-12 Teaching Fellows grants bring together elementary and secondary teachers and administrators with collegiate science, technology, engineering and mathematics faculty and students. The projects focus on increasing interest and learning in STEM disciplines for women and under-represented minority G K -12 students, instilling a lifelong awareness and appreciation for G K-12 STEM educational issues in Teaching Fellows, and providing G K-12 STEM Teachers with training and resources to develop professionally so that they can become better teachers using the latest teaching methods. NSF funds reach all 50 states through grants to nearly 2,000 universities and institutions. Each year, NSF receives about 30,000 competitive requests for funding, and makes about 10,000 new funding awards. The NSF also awards over \$200 million in professional and service contracts yearly.

FOR MORE INFORMATION

www.nsf.gov

www.ices.cmu.edu/pita/

www.lcti.org

www.lehigh.edu

www.crayola.com

www.evolution.com/er1

ABOUT ALLENTOWN SCHOOL DISTRICT

As the fourth largest of 501 districts throughout the Commonwealth of Pennsylvania, Allentown School District educates approximately 17,521 students in 23 pre-school, elementary, middle and high schools located throughout the City of Allentown, and employs over 2,000 administrators, teaching professionals and staff. The District has successfully completed a three-year Empowerment Plan. 2004 PSSA scores revealed 64 percent of all students were in the basic, proficient or advanced PSSA categories. Just fewer than 70% of ASD's students take part in a district-wide free or subsidized lunch program. Address: 31 S. Penn St., P.O. Box 328, Allentown, PA 18105. Phone: 484-765-4000. Website: www.allentownsd.org.

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