EFFECTIVE INTEGRATION OF NASA STEM CURRICULA IS ALLOWING STUDENTS TO APPRECIATE EARTH SCIENCE CONCEPTS

KHANDAKER, Nazrul I., Geology Discipline, Earth and Physical Sciences, York College of CUNY, 94-20 Guy R. Brewer Blvd, Jamaica, NY 11451, SCHLEIFER, Stanley, Geology Discipline, Earth and Physical Sciences, York College of CUNY, 94-20, Guy R. Brewer Blvd, Jamaica, NY 11451, MAHABIR, Krishna, Science and Robotics Dept., Grover Cleveland High School, 2127 Himrod Street, Ridgewood, NY 11385, WILLS, Newrence, NASA MAA Project (York College), York College (CUNY), 94-20 Guy R. Brewer Blvd, Jamaica, NY 11451 and KHARGIE, Matthew, Physics, York College (CUNY), 94-20 Guy R. Brewer Blvd, Jamaica, NY 11451, nkhandaker@york.cuny.edu
nkhandaker@york.cuny.edu

NASA Minority University Research and Education Project (MUREP) Aerospace Academy - MAA is a national, innovative activity designed to increase participation and retention of historically underserved and underrepresented K-12 youth in the STEM disciplines, particularly earth science and human exploration (HEO). HEO is dedicated to informing and educating the public about NASA's plans for a new era in space exploration. Utilization of NASA satellite images, online climate education, space mathematics and other earth science-related resources is allowing students to conduct basic research and prepare themselves for a New York City-wide science competition. In addition to offering school children a solid grounding in STEM and increasing the involvement of parents in their children's education, MAA at York fulfills many other important community needs. The majority of our MAA parents are immigrants and ESL people who greatly benefit from the program in terms of obtaining critical STEM education opportunities for their kids. The MAA Family Café allows them to locate, source, easily navigate and retrieve pertinent information and opportunities such as specialized high school admission, SAT, math and science tutoring, College Now Program, and most importantly online NASA educational resources for enhancing their understanding of STEM both for themselves and their kids. Family Café is certainly a venue where parents are also becoming STEM conscientious citizens and they often acknowledge the magical impact MAA did on their kids. Noticeable impacts demonstrated by many MAA students include higher performance in math and science tests, positive interest, renewed motivation, and curiosity. Pre-service teachers from the college also work for the program, thus in part fulfilling their fieldwork requirements and becoming better trained science teachers. Pre-service teachers are strongly encouraged to attend MAA classes, participate in STEM activities, and often guide students in the completion of tasks. With this close collaboration, pre-service teachers acquire an essential pedagogical component on formulating their own STEM activities and constructing a good lesson plan to achieve maximum effectiveness.

NASA MAA STEM Outreach Grant Funded This Project.

Dr. Marcia Keizs (3rd from the left), led the MAA Kick-off event and was utterly surprised to notice over 350 participants on a Saturday morning. Charlene Sherman (far right, StarLab teacher) and student aides and former SEMAA participants (far left) were also very delighted to have this program back.

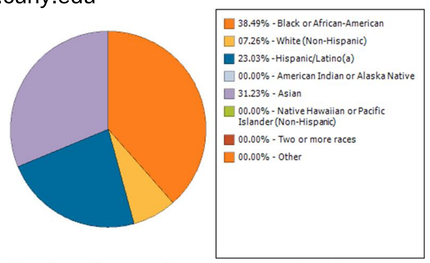
Astounding diversity is noticeable within the MAA Café Participants. Unity Deepan (3rd from the left) is enjoying a happy moment with her peers. Café Parents act as an advocacy group for furthering STEM Education in the community.

NASA Family Café parents allow and facilitate STEM access to their kids.

5th graders learning about aerodynamics via flight simulator.

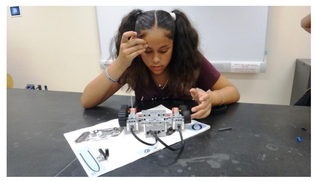
Flight Simulator is bringing lots of joy to the 3rd graders.

QUEENS — The final frontier is coming a little closer to home. This summer, kids can learn all about planets, participate in flight simulations and study 3-D printing, during a free NASA-designed program offered at York College in Jamaica. http://www.dnainfo.com/new-york/20140715/jamaica/bring-your-kids-flight-simulator-planetarium-at-free-nasa-camp



Direct Student Participants Diversity (total served 1710; 2015- 2016)

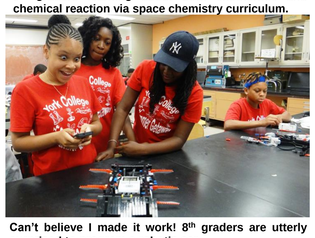
In the spring of 2015, an interdisciplinary team of York students and staff went head-to-head against the best engineering institutions in the country. Exploring and pushing the boundaries of robotic mining technology destined for Lunar and Martian soils.
Matt Khargie (former SEMAA student, now Physics major @ York and pre-service teacher in the MAA) with Dr. Khandaker (MAA Site Director @ York) proudly displaying Martian Sandbox robotic vehicle transporting sand (basaltic debris).



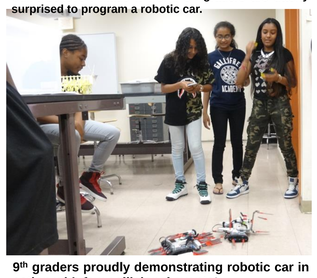
How can I make it operational? 8th grader is deeply thinking to complete a robotic task.

Yes it is working!! Robotic task fulfilled. Proud 8th graders with a big smile.

9th graders learning about both exothermic and chemical reaction via space chemistry curriculum.



Can't believe I made it work! 8th graders are utterly surprised to program a robotic car.



9th graders proudly demonstrating robotic car in action with few collisional events!

Martian Sandbox brought quite an excitement to the 3rd and 4th graders. Matthew Khargie and 3rd grade teacher Kyshia Lawrie letting them soak in with STEM knowledge.

JetBlue Pilot Leighton Jamieson shared his aviation experience with 2nd graders.

Left to right: AEL Coordinator Newrence Wills (former SEMAA student; recently earned BS in Sound Engineering from New York City Tech) is having a great moment with Pilot Leighton Jamieson and his daughter (MAA student).

3rd and 2nd graders are not left behind! Look at what we made! Martian Habitat from ordinary materials.

From left to right: Kathy Robbins (former SEMAA pre-service teacher, now completing MS, City Tech), Ali Zarine (former SEMAA teaching assistant, now employed by the EPA), Khandaker, Charren Cabaroy (former SEMAA teaching assistant), and Shirley Jackson (executive member of the Association for Women Geoscientists; now completing an MS in Sustainability, City College, NY).

Grand finale and proud NASA students celebrating weeks of hard STEM activities conducted at York College.

Saintedym Wills (former 2000 SEMAA student, now PhD candidate, Duke University) was awarded an NIH Ruth L. Kirschstein predoctoral fellowship.
NASA STEM does miracle!

Narendra Gurcharan took the lead to demonstrate NASA Martian Sandbox Robotic Vehicle to hundreds of incoming freshman and Matthew Khargie urged everyone to sample NASA STEM resources.

Conclusion

NASA MUREP Aerospace Academy is opening up an excellent online resource in addition to offering hands-on, experiential learning opportunity (ELO) to the younger students (K4-9) by allowing them to build rockets and various robotic components (EV3 Mindstorm). It also engages students to program, write code and conduct STEM experiments to fulfill their inner curiosity and unleash an outburst of energy full of excitement and readiness to embrace challenging tasks.

Integration of multidisciplinary STEM subjects coupled with ELO research activities at an early stage can play a pivotal role in motivating K9-16 students to appreciate the broader science contexts and their relevance to geosciences. From recruitment and retention point of view, it should be viewed as being of utmost academic importance.