City University of New York (CUNY)

CUNY Academic Works

Publications and Research

York College

2017

EXPERIENTIAL LEARNING OPPORTUNITY (ELO) AND UTILIZATION OF FIELD-AND-DATA- BASED INFORMATION OBTAINED THROUGH THE INFUSION OF TECHNOLOGY: HIGHLIGHTS ON NASA STEM AND EARTH SCIENCE CURRICULA

Nazrul I. Khandaker
CUNY York College

Matthew Khargie
CUNY York College

Shuayb Siddiqui
Townsend Harris High School

Sol De Leon
St. John's University

Katina Singh
SUNY Stony Brook

See next page for additional authors

[How does access to this work benefit you? Let us know!](#)

More information about this work at: https://academicworks.cuny.edu/yc_pubs/197

Discover additional works at: <https://academicworks.cuny.edu>

This work is made publicly available by the City University of New York (CUNY).
Contact: AcademicWorks@cuny.edu

Authors

Nazrul I. Khandaker, Matthew Khargie, Shuayb Siddiqu, Sol De Leon, Katina Singh, Newrence Wills, and Krishna Mahibar

EXPERIENTIAL LEARNING OPPORTUNITY (ELO) AND UTILIZATION OF FIELD-AND-DATA- BASED INFORMATION OBTAINED THROUGH THE INFUSION OF TECHNOLOGY: HIGHLIGHTS ON NASA STEM AND EARTH SCIENCE CURRICULA

| Nazrul I. Khandaker, York College of CUNY | Matthew Khargie, York College of CUNY | Shuayb Siddique, Townsend Harris High School | Sol De Leon, St. John's University |
| Katina Singh, Stony Brook University (SUNY) | Newrence Wills, York College – CUNY | Krishna Mahabir, Grover Cleveland High School |

Summary

There is a greater emphasis on hands-on involvement and critical thinking skills in the geosciences and other STEM fields to inspire and engage K- 16 students to value scientific content and enable them to discover the well-documented nature of the fundamental scientific principles needed to explain various earth science and other STEM-related core phenomena. NASA MUREP (Minority University Research and Education Program) Aerospace Academy also known as MAA curricula are ideal for engaging K1-16 students in this context, since grade-specific lesson plans open-up a plethora of pedagogically sound and relevant earth science activities. These include earth's materials and properties, meteorites, crystal growth, robotics, coding, hot air balloon, flight simulation, star gazing, material science, density measurement of various objects, aerodynamics, liquid nitrogen and other cryogenic activities, weather tracking, measuring air turbulence via wind tunnel activities, etc.

Real-time, hands-on activities built upon fundamental physics, chemistry and mathematical principles; create an opportunity for the participating students to appreciate the relevance and importance of STEM activities across the curriculum. Furthermore, these enable students to acquire strategic and pivotal knowledge towards fulfilling one of the core underlining pedagogical components labeled as critical thinking skills. One of the advantages of disseminating basic science concepts to the students is its powerful constraint on having group dynamics, time management, and understanding research methodology applicable to these activities.

Narendra Gurcharan (first from the right, pre-service teacher) is about to compete in 2017 Robotic Mining Competition. Kennedy Space Center. May 23, 2017

Narendra Gurcharan (first from the right, pre-service teacher) is about to compete in 2017 Robotic Mining Competition. Kennedy Space Center. May 23, 2017

Enjoying Flight Simulation.

First time ever to see meteorite!

Learning about density segregation.

Mike Sanchez is very happy to share his Martian Habitat.

Very eager to learn about programming a robot!

Obstacle game with robotic exercise.

Holding perfect hexagonal quartz.

Fun with Star Gazing.

NASA students and group dynamics in action.

Ready to launch their own rockets.

Parents are happy to notice robotic display.

Sol De Leon is working on her research.

Jubilant 3rd graders just came out of the Star Lab.

Quite an excitement during the rocket launch.

NASA Pre-service teachers make it happen.

Wow! Cryogenic ice cream from liquid nitrogen.

Built their own planes and ready to test out.

Conclusion

Data collected on over 1000 students positively shows students' liking and subsequent success in STEM education at an early age.

In general, responses to items expressing positive experiences with science received high levels of agreement.

Similarly, students gave high levels of agreement to items about the importance of science: 92% agreed that they are learning interesting things about science; 88% agreed that science is important for society and 88% agreed that science improves our lives.

Hands-on, field-based, critical thinking and ELO-related tasks are found to be a strong determinant in the evaluation matrix.

Furthermore, respondents demonstrated enthusiasm for learning and indicated and that they are engaged in science in ways that supplement and enrich their schoolwork.

York College MAA Program funded by:

Final Paper Number 77-8

Geological Society of America Abstracts with Programs.
Vol. 49, No. 6. Doi: 10.1130/abs/2017AM-303365