

POSITIVE OUTCOMES OF INVOLVING UNDERGRADUATE AND HIGH SCHOOL STUDENTS IN BROADER ASPECT OF EARTH SYSTEM SCIENCE THROUGH PEER MENTORING AND RESEARCH ACTIVITIES

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SUMMARY

The importance of involving undergraduates and high school students in field-and-laboratory research investigations at an early stage through peer mentoring has been clearly demonstrated as a critical tool for essential training to fully comprehend academic content and a deeper understanding of the various STEM, geoscience-and- environmental science related topics. As far as we are concerned, student presenters/participants (over 1000) in our topical sessions since 2004 have always found face-to-face presentation through poster sessions to be an ideal scientific venue where exchange of knowledge and discussion are fruitful, constructive and encouraging. It is quite revealing to note that among the student participants, 60% were female and they also dominated both undergraduate and high school populations! Student- led presentations at the GSA annual meeting (s) opened a plethora of academic gains, including appreciating the relevance of the topics presented, networking opportunities, preparation for graduate studies, and increasing self-esteem. Several student presenters, who have now completed their college education and are currently employed, have responded to us and said that their current employment experience is enhanced by the fact that our topical sessions primarily focused on the acquisition of experiential learning skills and provided them with career-oriented knowledge. It clearly supported our belief that research experience is vital to a well-rounded education and readiness for professional employment. We find this to be very useful in attracting urban students, particularly low-income and academically challenged students to pursue the geosciences since traditional classroom teaching alone cannot effectively create a sound pedagogical environment suitable to promote geoscience as a college option or as a career choice. It is becoming a routine practice in many City University of New York (CUNY) institutions, particularly York College, Virginia Commonwealth University, and city high schools to involve underrepresented students at an early stage and bring research opportunities to them through STEM research initiatives supported by MUREP Aerospace Academy - National Aeronautics and Space Administration (NASA), State Education Department, AT&T, Con Edison, National Grid, and National Science Foundation (NSF). Such collaboration ensures that the STEM/geosciences pipeline is constantly enriched in order to meet the future needs and challenges faced by society.



Fig.1 Studying Mylonites

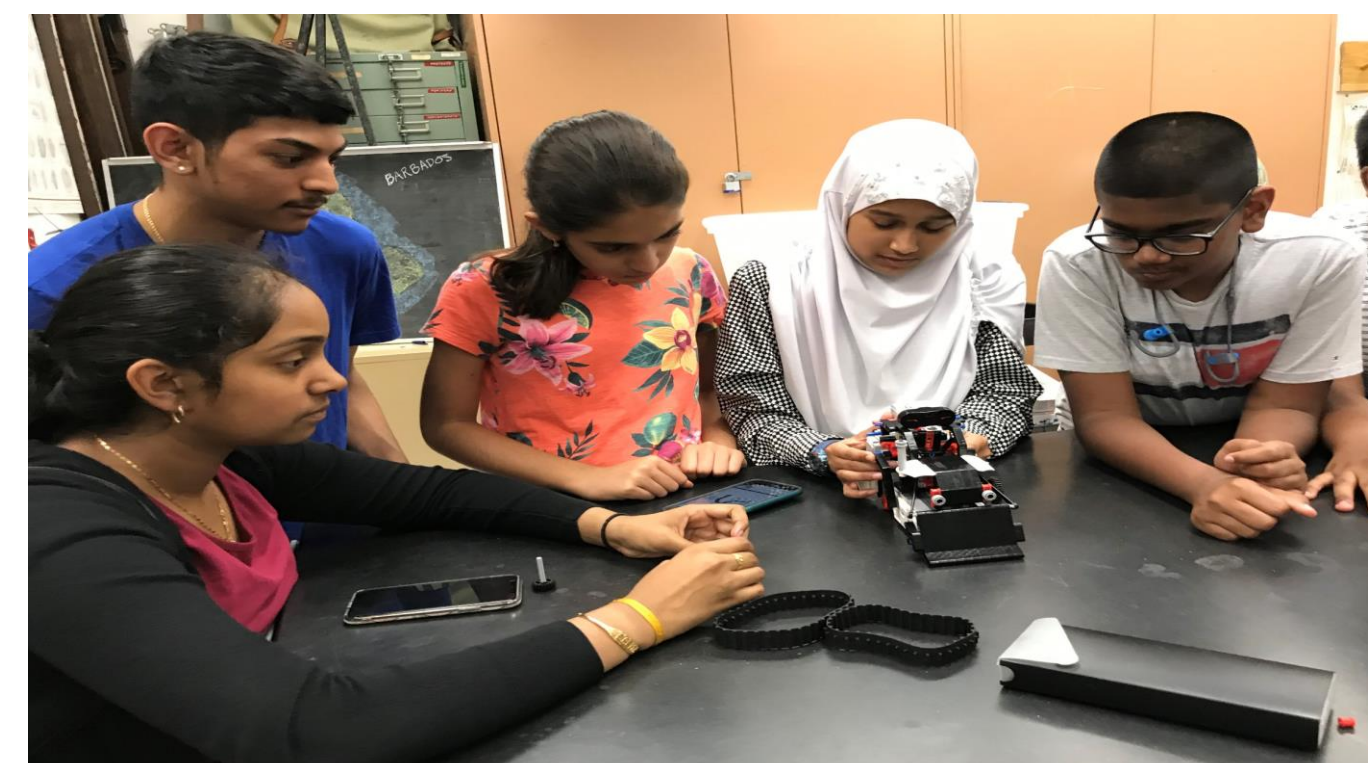


Fig.2 Middle school students using EV3 Mindstorm



Fig. 3 Students-led presentations

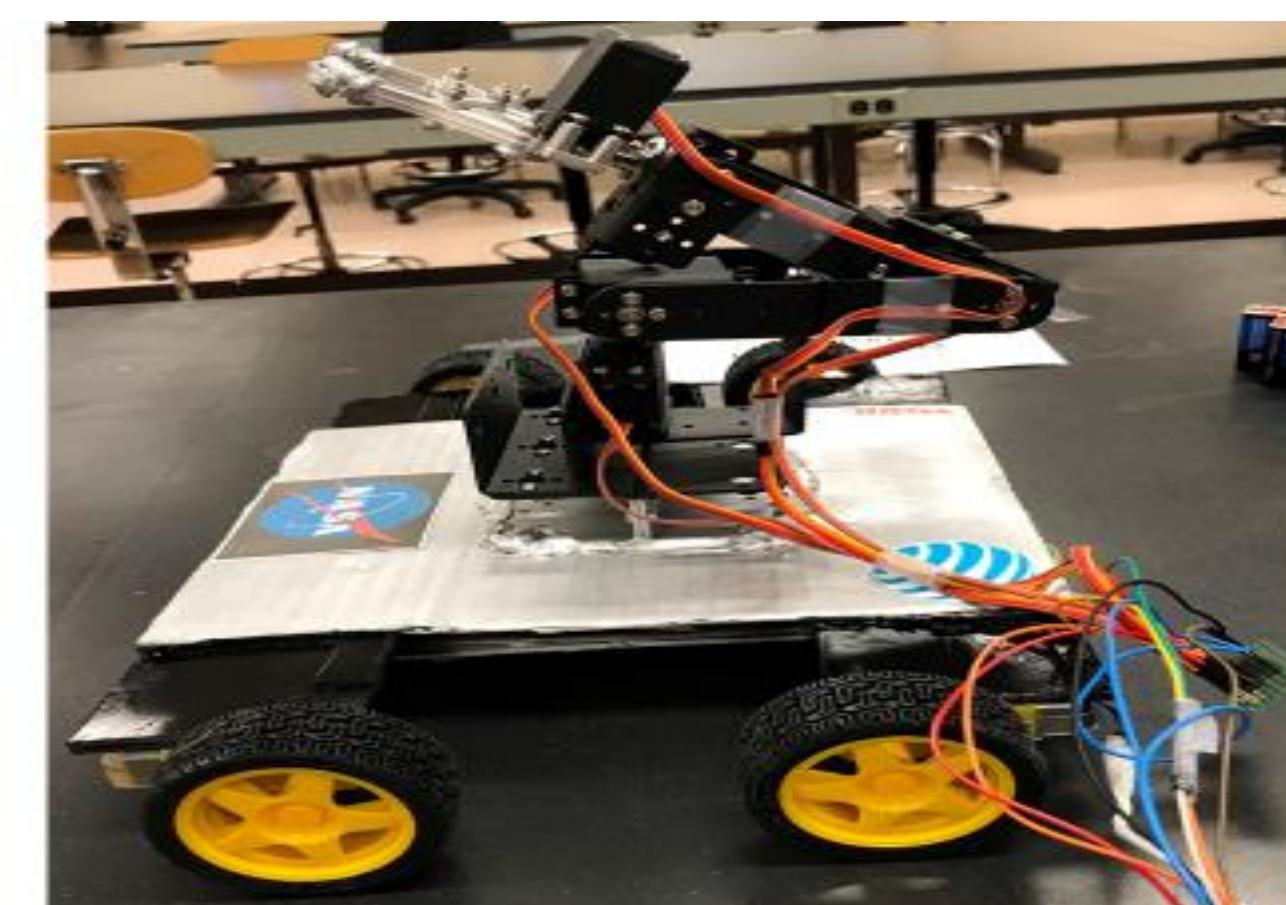


Fig.4 Building Robot to transport rocks



Fig. 5 Family involvement in STEM Education



Fig. 6 Launching Rockets

STEM ACTIVITIES



Fig. 7 Engineering Design



Fig.8 Understanding electric circuit



Fig.9 Summer Research Students and Mentors



Fig.10 Helping students to make crystal



Fig. 11 Having fun with flight simulation



Fig. 12 Younger kids love star gazing

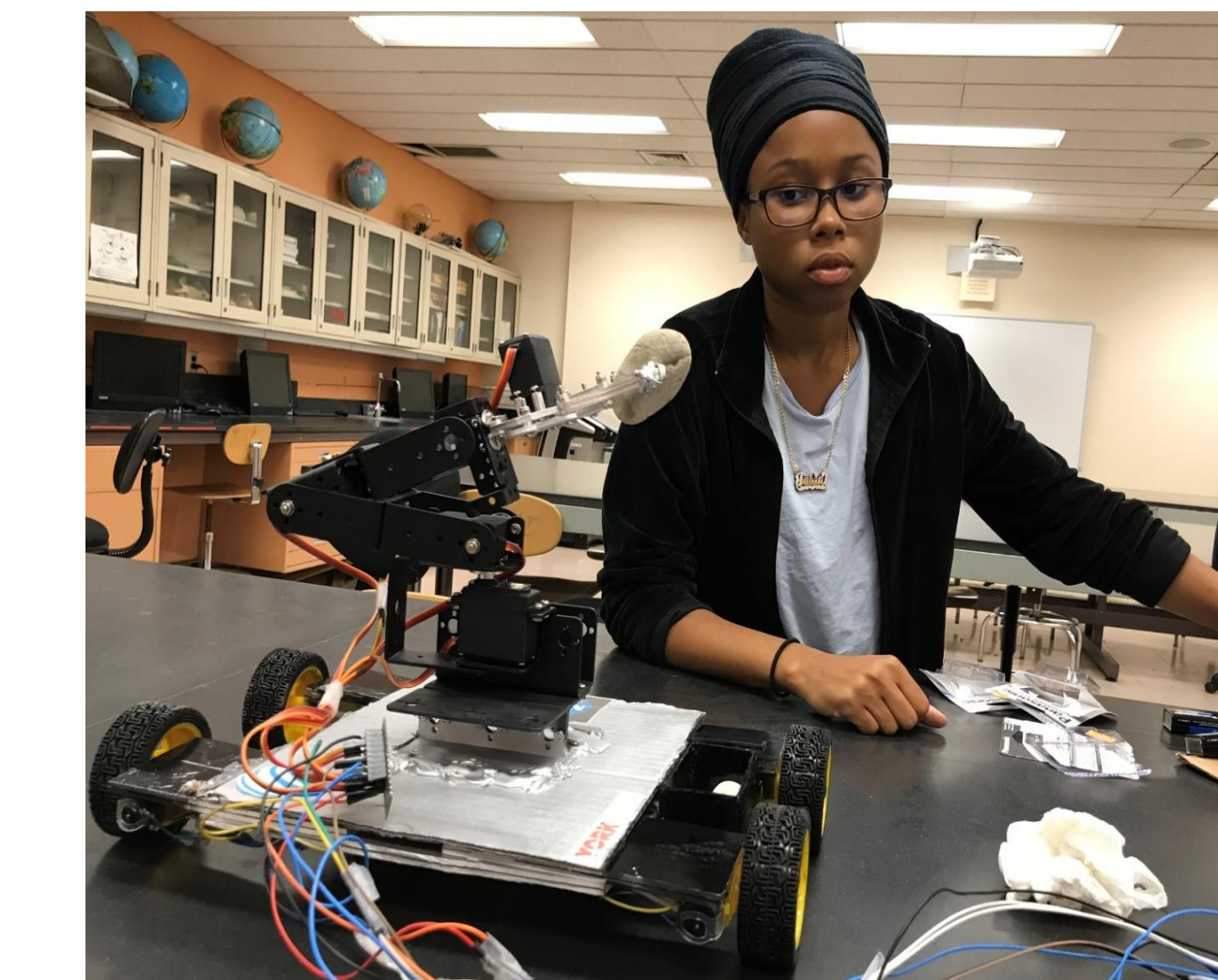


Fig.13 Prototype robot from scratch



Fig. 14 Using Robot to determine velocity



Fig. 15 Understanding measurement



Fig. 16 Middle school students engaged in robotics

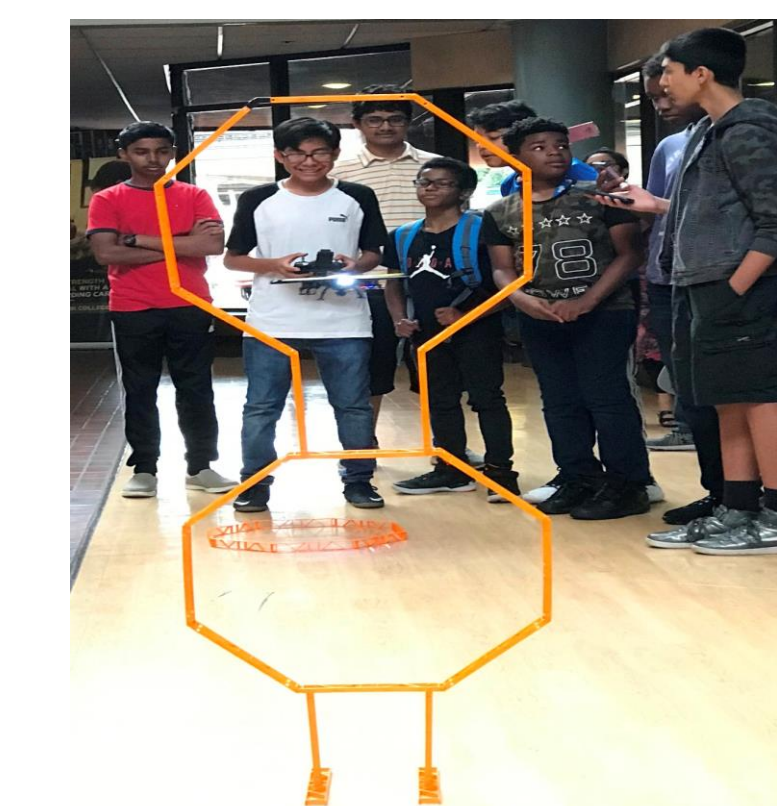


Fig. 17 Drone activity



Fig. 18 Parent prepared collage – supporting STEM

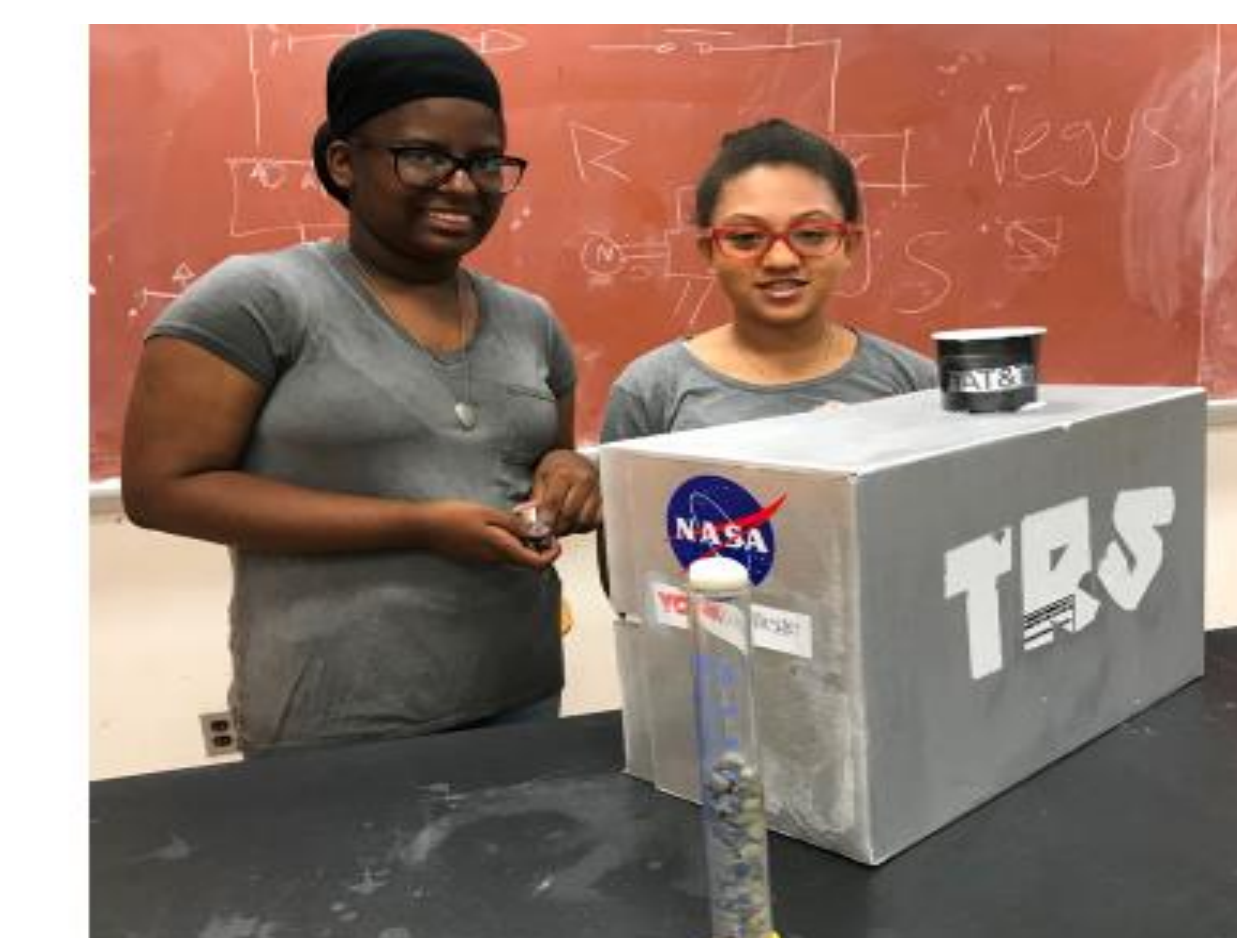


Fig. 19. Building TRS



Fig 20. Understanding STEM Manual

CONCLUSIONS

Current STEM activities are found to be very useful in attracting urban students, particularly low-income and academically challenged students to pursue the geosciences since traditional classroom teaching alone cannot effectively create a sound pedagogical environment suitable to promote geoscience as a college option or as a career choice.

It is becoming a routine practice in many City University of New York (CUNY) institutions, particularly York College, Virginia Commonwealth University, and city high schools to involve underrepresented students at an early stage and bring research opportunities to them through STEM research.

These initiatives are supported by MUREP Aerospace Academy (aka MAA) - National Aeronautics and Space Administration (NASA), State Education Department, AT&T, Con Edison, National Grid, and National Science Foundation (NSF). Such collaboration ensures that the STEM/geosciences pipeline is constantly enriched in order to meet the future needs and challenges faced by society.