

Taking Authentic Science Research to New Heights Through the International Student and Teacher Exchange Program (ISTEP)

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● Introduction

The International Student and Teacher Exchange Program (ISTEP) elevates to new heights authentic science research programs (ASRP) that bring together high school students and research scientists. During the past two years, 10th-12th grade students from New York City and Singapore, joined this year by a group from the Netherlands, have convened at the Lamont-Doherty Earth Observatory of Columbia University (LDEO) to conduct fieldwork about tree rings, and water and soil chemistry, and to learn how scientists analyze and publish their discoveries.

All of the students participate in ASRP through their home schools, but ISTEP extends their knowledge and skills into new subject areas and demonstrates the power of larger-scale investigations. ISTEP is organized by Sau Ling (Charlene) Chan, founder of the Manhattan Center for Science and Mathematics High School (MCSM) ASRP, with coopertaion from Dr. Brendan M. Buckley of the LDEO Tree Ring Lab, Dr. Michael J. Passow of the Earth2Class Workshops for Teachers at LDEO, and Dr. Glen R. Kowach of the City College of New York Chemistry Department.

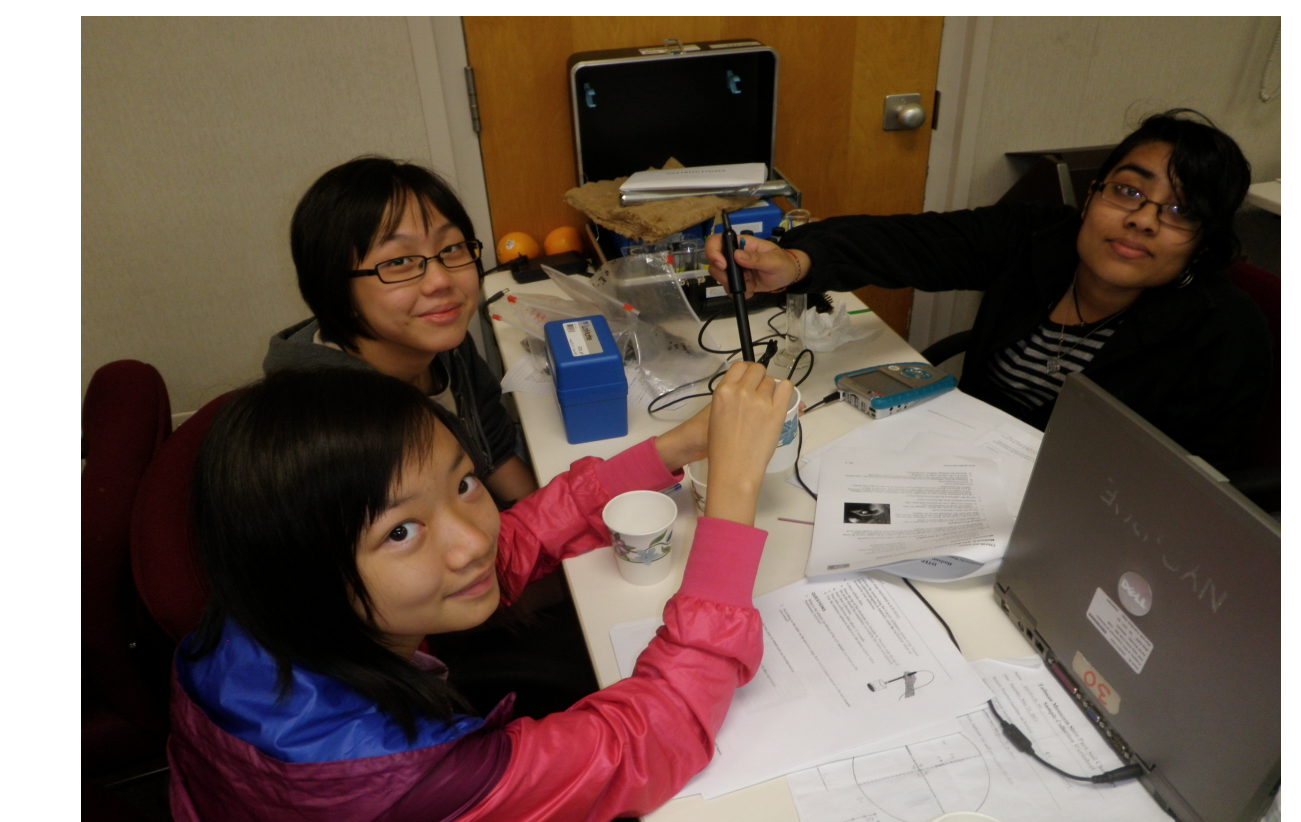
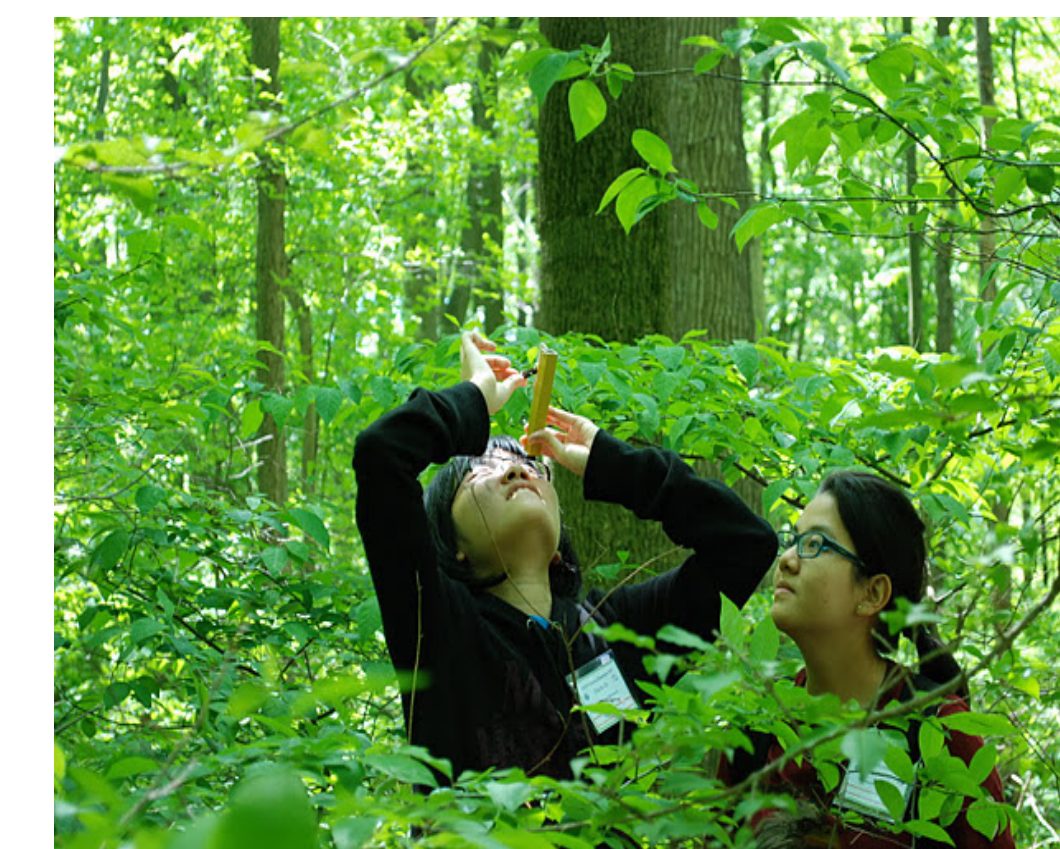
Selected students from the ASRP of Temasek Junior College and Nanyang Girls High School of Singapore and Maurick College, Vught, the Netherlands, joined students from the MCSM in May 2011 for a weekend of field experiences based at LDEO. Some had participated in the first ISTEP program conducted in 2010. (Chan, et al., 2010) During several school days in advance of the weekend program, students from the three schools met at the MCSM to share their school experiences and receive training in the use of the data collecting instruments.

● ISTEP Field Experiences

Early Saturday morning, participants travelled from Manhattan to the Lamont campus in Palisades, NY, about 15 km from NYC. During morning and afternoon shifts, students rotated among stations in the Tallman Mountain State Park near the Lamont campus to conduct soil chemistry and tree ring/forest ecology studies, or paddled canoes through Sparkill Creek at the edge of the park to reach locations where water samples were collected. Ten LDEO scientists, grad students, and supporters of the MCSM ASRP assisted as volunteers.

At the end of the day, everyone rode to the Alpine Boat Basin of the Palisades Interstate Park-New Jersey Section for an overnight camping experience on the shores of the Hudson River. This enhanced the unity developed among the students, and was certainly not what they expect in a visit to New York City.

On Sunday, students returned to the Lamont campus to analyze their data using chemical kits and other instruments used by the Tree Ring Lab scientists. During the next week, before returning to their home countries, the students continued their analytical investigations and provided preliminary results through a poster session held in conjunction with the MCSM ASRP annual science symposium.



● Evaluation

Student and teacher responses gathered by a survey were overwhelmingly positive. Many cited the opportunity to use scientific equipment in the field and from the canoes, interacting with students from other parts of the world, and engaging in activities unlike any in previous experiences in their home schools. All students indicated that they plan to continue research projects when they go to college. Future collaborations among the schools may involve travel to Singapore and the Netherlands by MCSM students, submission of research results to national and international science fair competitions, and inclusion of student-collected data in research efforts by the scientists.

● Future Plans

Planning is underway for a third ISTEP experience to be held in June 2012. All four schools will again send students and teachers. This year's program will be held at the Black Rock Forest Consortium, a science education center located about 20 km north of the Lamont campus in the Hudson Highlands.

● Support and References

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Reference:

S.L. Chan-Lee, B. Buckley, G.R. Kowach, and M. J. Passow, 2010, "ISTEP: An International High School Student and Teacher Research Collaboration." *The Earth Scientist*, v. 26, issue 4, pp. 18 - 22.