urban advantage

middle school science initiative


Urban Advantage (UA) is a standards-based collaboration between urban public school systems and science-rich cultural institutions including zoos, botanical gardens, museums, and science centers to improve students' knowledge of science and engineering practices.

Drawing on the educational resources of the informal science community and its long-term commitment to science education, **the New York City UA program provides professional development for middle school science teachers and opportunities for both students and teachers to engage in authentic science**—conducting investigations in which they pose scientifically oriented questions, prioritize evidence, and develop logical explanations, which are essential for understanding science.

UA learning experiences align with the science standards and assessments in school systems, including the NYC Department of Education's Performance Standards, which define four types of science investigations for student projects: controlled experiments, field studies, design projects, and secondary research (using scientific data sets obtained by others). UA partner institutions have developed expertise in the different types of science investigations, with the botanical gardens focusing on controlled experiments, the zoos and the aquarium focusing on field studies, the science center focusing on design projects, and the natural history museum focusing on secondary research.

The name "Urban Advantage" reflects the UA partners' belief that it is an advantage to live in an urban setting with so many science-rich cultural institutions and nature facilities, and that it is also an "urban advantage" to develop science-rich out-of-school experiences for students and families.

Urban Advantage was launched in 2004 in New York City by the American Museum of Natural History in collaboration with the Brooklyn Botanic Garden, the New York Botanical Garden, the New York Hall of Science, the Queens Botanical Garden, the Staten Island Zoo, the Wildlife Conservation Society's Bronx Zoo and New York Aquarium, and the New York City Department of Education, with leadership funding from the New York City Council.

UA Framework

Urban Advantage includes six research-based components designed to support schools, principals, teachers, students, and families. They are:

1. High-quality professional development for teachers and school administrators
2. Classroom materials and equipment for schools, teachers, and students that promote scientific inquiry and authentic investigations
3. Access to UA Partner institutions through free school and family field trips
4. Outreach through family events, celebrations of student achievement, and parent coordinator workshops
5. Capacity-building and sustainability structures, including a network of demonstration schools and support for the development of lead teachers
6. Assessment of program goals, student learning, systems of delivery, and outcomes.

Program Impact

Urban Advantage serves over 30 percent of New York City schools with eighth grade students.

Program-wide assessments show that UA has had a demonstrable impact on the science education programs in New York City Department of Education's middle schools:

- Learning experiences in UA classrooms have become more inquiry-based.
- UA teachers report more mastery of science content and an increased capacity to support students' investigations.
- An unprecedented number of school groups and families have visited the eight UA partner institutions.

Students at UA schools outperform students at non-UA schools on the New York State Intermediate-Level (8th grade) Science exam.

- In 2005-06, the third year of the program, 44.2% of students at UA schools were proficient, compared to 40.5% at non-UA schools.
- In 2008-2009, 55.9% of students at UA schools were proficient, compared to 46.2% of students at non-UA schools.

Participating in UA also contributes to post-8th grade outcomes. Students at UA schools were found to be 25.5% more likely to take the Living Environment Regents exam in 8th or 9th grade and showed significantly higher levels of proficiency than students in non-UA schools.

Working together, the UA Partners — public schools, science-rich cultural institutions, and the NYC Department of Education — have succeeded in improving the implementation of middle school student investigations.

Scientific and Engineering Pratices

UA students have opportunities to immerse themselves in scientific and engineering practices and explore why these practices are central to science and engineering. The K-12 practices described below are derived from those that scientists and engineers actually engage in as part of their work.

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument for evidence
8. Obtaining, evaluating, and communicating information

From *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*, National Research Council, 2012.

urbanadvantagenyc.org

A partnership program in science education

American Museum of Natural History

Wildlife Conservation Society Bronx Zoo

Brooklyn Botanic Garden

Wildlife Conservation Society New York Aquarium

The New York Botanical Garden

NYC Department of Education

nysci New York Hall of Science

Queens Botanical Garden — Where people, plants, and cultures meet

Staten Island Zoo

CREDITS

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