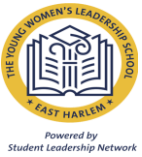




Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE



The City College
of New York



Student Leadership Program Research Internship 2022



Purpose

Hudson River Park's Student Leadership Program (SLP) is a paid summer research opportunity for female-identifying high school students in New York City. This project is possible through a collaboration of STEM institutions including Hudson River Park's River Project, The City College of New York (CCNY), The Young Women's Leadership Schools of NYC (TYWLS), The Pinkerton Foundation, The Intrepid Sea Air and Space Museum and Lamont-Doherty Earth Observatory (LDEO). In 2022, this program included eight high school interns and two undergraduate mentors from CCNY.

The SLP internship is designed for high school aged interns to gain experience and confidence in STEM through authentic research, professional development workshops, and near-peer mentorship. SLP aims for interns to complete the summer program with a stronger science identity, an expansive STEM network, and greater exposure to science skills – all of which will help them succeed in their academics and future careers.

Hybrid Internship Model

The Science Leadership Program was hosted in a hybrid format, with two remote and two in-person days. Though this format was initially established in response to the COVID-19 pandemic, it has been found to be effective. The balance of in-person and virtual days allows for interns to gain experience working independently and nurture relationships within their cohort.



Fig. 1 | 2022 SLP interns walking to Pier 26 to check fish survey collection gear.



Fig. 2 | The SLP interns on Pier 40 with water samples for eDNA.



Fig. 3 | SLP interns in the Wetlab at Pier 40 with River Project staff.

Key Questions

- Does the SLP internship program help interns feel more confident in their STEM skills and knowledge?
- How does participating in a STEM internship affect interns' identity in the field?
- Does a tiered mentorship structure help support emerging STEM leaders?

Methods

- Interns and mentors completed a pre and post-program survey about their attitudes toward their peers, their mentors, STEM skills, confidence and other career-based topics.
- Interns met virtually and in-person for six weeks with the support and guidance from undergraduate mentors and Park staff.
- In-person days involved a variety of hands-on field research, including oyster monitoring, fish trapping, marine debris cleanups and eDNA collection.
- Interns participated in a variety of workshops hosted by STEM professionals at all career levels.
- Interns designed individual research projects focused on plastic debris founds in seagull boluses

Field Science Opportunities

Throughout the summer, SLP interns and mentors participated in ongoing scientific research projects at Hudson River Park. In-person days focused on experiential field work to ensure interns were introduced to real-world STEM applications such as data collection, laboratory equipment training, and science communication. Interns checked fish collection gear, observed organism settlement in tide pools, monitored oyster growth, tested water quality, analyzed benthic sediments, processed eDNA, dissected fish, and kayaked on the Hudson River. This suite of field tasks provided hands-on experience to develop their STEM identities and confidence in scientific work & methods.



Fig. 4 | Dissected seagull boluses were analyzed to determine quantity of inorganic materials.



Fig. 5 & 6 | Interns checking fish traps on the Pier 26 floating dock.



Fig. 7 & 8 | Interns monitoring tide pools (left) and measuring oysters (right).

Major Findings

The eight interns completed a pre-survey on the first day of the program. This survey was designed to best understand their science confidence, STEM identity, and the presence of science in their daily lives. This same survey was administered after the conclusion of the program to measure its effect. Interns responded to a variety of prompts on a Likert scale of 1 to 5, with 1 being the lowest and 5 being the highest.

Survey Results:

When asked to rate their confidence in a variety of STEM research skills, interns demonstrated an average 0.68 point increase in confidence between the pre and post surveys. For example, confidence in “Public Presentation” was rated an average of 3.5 in the pre-survey and an average of 4.4 in the post. The two interns who initially rated their confidence at a 1 and 2 before the program increased to a 3 and 5, respectively.

Similarly, interns rated their agreement with statements intended to assess their STEM identity. These included: “Good scientists are totally objective,” and “It is important to increase diversity in sciences.” Agreement with these statements increased on average 0.19 points. The greatest increase was in agreement with the question, “Scientists should involve members of society (mangers, policymakers, citizens) in their research as much as possible.” In the pre-survey, interns mostly rated this a 3 or 4; whereas, in the post-survey, they mostly rated it 4 or 5. All eight interns self-reported an increase of at least 0.25 points confidence in all fourteen STEM skills.

“I learned new skills like researching, writing backgrounds, making data tables, collecting data, and being more interested in learning about environmental science. Every single thing about this program was amazing: the research, activities, mentors, and scientists.”

- Alaa Attareb

“A new skill I’ve achieved and am learning is to speak up a little more to ask questions and ask if I’m confused about something. I’ve learned to take a little bit of risk in the STEM community when it comes to asking questions or talking.”

-Chelsea Flores



Fig. 9 | Interns gathered after presenting their projects to family, colleagues, and friends at Pier 40.

Takeaways

The 2022 season of Hudson River Park's Student Leadership Program was successful in providing varied STEM experiences to increase confidence for interns. The near-peer mentorship model provides growth opportunities for both high-school interns and their undergraduate mentors.

Anecdotally, interns appeared to demonstrate higher levels of confidence after participating in SLP. Exposure to both mentors and professionals at several career levels demonstrated potential pathways and career opportunities in the STEM field.

Self-reporting is a powerful tool to understand the effectiveness of a program for each intern individually.

Future Directions

Future iterations of SLP will pursue expanding the intern cohort through the possibility of additional funding via grants. Increased funding will allow the Park to recruit additional high school interns and undergraduate mentors as well as provide stipends for all those involved.

Beginning in 2022, Hudson River Park has joined the New York City Science Research Mentoring Consortium (NYCSRMC), consisting of over 23 partner programs engaging with student-focused science research. Participation in the Consortium creates opportunity for the Park to connect with partner organizations and identify avenues for growth. Additionally, this network provides access to resources for increasing equity in the program's design and execution.



Fig. 10 | Interns gathering benthic sediment samples at Pier 40 via Eckman dredge.



Fig. 11 | Two interns collecting water samples at Pier 40.