THESANDBOXBLOG

Year three with NYU's young female engineers at the Brooklyn Bridge Workshop

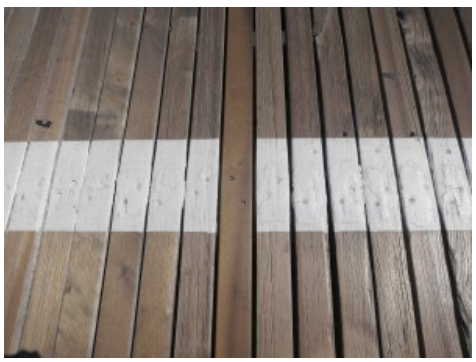
April Greene — July 28, 2015

For the third year running, Pilot Projects founder and director Scott Francisco created a unique day-long workshop all about suspension bridges for students from New York University's Girls Science, Technology, Engineering, and Math program (GSTEM). The six-week summer intensive for high school juniors in "STEM" fields of study allows students to explore the possibility of a career in the mathematical or physical sciences by working on real-world projects alongside professionals.

GSTEM's first aim is to encourage girls who are already excelling in these fields to pursue them in their education and careers; its second is to build a community of women scholars in these areas.

"Hands-on learning is so important for engineering," said Scott. "Nothing can replace the impact of building and testing a real structure; seeing how it really works. This is the next generation of leaders and innovators. It's great to be a small part of what they will eventually accomplish in the world!"

The day started with an introduction by Scott at NYU's Warren Weaver Hall, home of the prestigious Courant Institute of Mathematical Sciences. His talk included a brief history of the Brooklyn Bridge, with drawings, photos, and stories from the time of construction—including of course the now-famous contributions of Emily Roebling. He then distributed a "materials list" for building a suspension bridge (that included "steel," "tension," and "curiosity"), and the parameters for the bridge-building exercise the girls would undertake in the afternoon.



L to R: This replaced plank reminded us of the Brooklyn Bridge Forest!; the network of cables so unique to the Brooklyn Bridge (the diagonal stays were later understood to be structurally redundant)

"Scott got the girls laughing and engaged," said Christine Keefe, GSTEM Program Coordinator. "But what I really appreciated was that he focused on some of the aspects of being a successful engineer that aren't talked about so much: good communication, long-lasting focus, the ability to let an old idea go if it doesn't work—to not be too precious about it. Those are important factors, and they don't get a lot of airtime."

See more images from the GSTEM workshop

After the talk, the group made their way to the Manhattan-side base of the Brooklyn Bridge to explore its details up close and first hand. Hugging one of the 16" main cables was highly recommended, in order to get a feel for the 5,434 1/8" diameter wires inside them holding up the entire bridge! Scott was joined by Amy Harrington, an engineer with structural engineering firm Silman Associates, who volunteered her day to be an advisor and mentor. (Silman Associates is also contributing to Pilot Projects' Co-Build Kathmandu project.)

Once in Brooklyn Bridge Park, participants enjoyed a lunch break in the shade, then separated into three teams to take on the day's challenge: design a suspension bridge on the lawn that would support one team member in the center, at least eight inches above the ground. The girls were allowed to use any material from the kits they were given (which included wooden planks, chopsticks, and vintage sewing thread that, coincidentally, was manufactured in what is now Pilot Projects' office space in the heart of NYC's former garment district!), and prepared to be judged not only on the strength of their bridges, but also on the efficiency, beauty, and intentionality of their designs.




Top left: Scott and Amy demonstrate some bridge building principles; the GSTEM teams calculate, design, and build





It took the teams a few minutes to get their bearings and decide who among them would take on which tasks, but then their discussions picked up steam, with Scott, Amy, and Christine checking in and assisting as needed.

"How can we angle these chopsticks to make our lives easier?"

"You've got asymmetrical loading on your towers. What does that mean?"

"We'll have to wrap this string around 150 times. Should we take turns?"

Amy summed up the process this way: "I think engineering often seems intimidating and overly complex when you're a high school student. This project showed the girls that any one of them could do the math problem that gave them a basis for their design, and each one of them could think and design like an engineer."

Many sketches, a few snapped threads, and a couple of hours later, the teams were ready to test the bridges they had calculated, designed, and built themselves.

It was literally "down to the wire," but one team prevailed: their bridge suspended one of their team members eight inches off the ground over a 10-foot span using only fine sewing thread for suspension cables.

We congratulate all the GSTEM participants on a job well done, and hope they had as much fun as we did at the workshop. How better to spend a sunny Friday afternoon in New York City than with a picnic, a little math, and some hands-on experimental construction?

Tags: nyc, nyu, hands-on learning, brooklyn bridge forest

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