Bridge to Learning

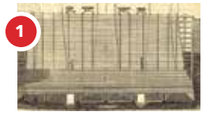
What do 2nd graders get out of an in-depth investigation of the "Eighth Wonder of the World?" Plenty, according to faculty and administrators who have guided students through the reconstruction of the Brooklyn Bridge. A rite of passage for generations of Stevens students, the learning experience is a capstone to the blocks program, an engineering challenge and a stepping stone to the high-level critical thinking, research and communication skills exhibited in Portrait of a 21st Century Graduate.

It was the Friday before spring break, but 2nd grade head teachers Lindsey Gianetti Cerrachio (Hoboken Campus), and Molly Grochala and Lauren Azzollini (Newport Campus) were already planning for the Brooklyn Bridge project, the interdisciplinary study that encompasses nearly every academic subject and learning special during the third trimester of school. The curriculum planned and adopted by Stevens faculty is comprehensive and complex.

"We start out by studying different types of bridges in science so students can understand what a feat it was to actually suspend the bridge over the river," explained Lindsey, who has taught the Brooklyn Bridge study as an associate and head teacher at Stevens.

When it opened in 1883, the Brooklyn Bridge was the world's first steel-wire suspension bridge. Spanning nearly 1,600 feet across the East River, the national landmark was a symbol of innovation and progress. Once students understand the fundamentals of suspension bridge building, they delve into the history, design and engineering of the Brooklyn Bridge itself. Architect Til Globig visits the classes and, in a full-scale construction of the bridge, which is built the length of the Newport Campus gym, students test principles such as compression and tension. They read nonfiction books about the bridge and consult source material and other resources. Together, the class creates a timeline that traces the reasons for building the bridge, the decades of planning and construction and the ways it shaped the surrounding neighborhoods and the entire city.

By the time a 2nd grade class visits the bridge, they are able to survey and explore the structure as scientists, engineers, historians and urban planners.



1 Caissons form the foundation of the two bridge towers. Caissons Committee students research the science behind the watertight structures and construct the foundation.

2 An architect speaks to 2nd grade classes. Using ropes, students test basic principles of physics and learn about the types of support a bridge needs to stand.

3 Through trial and error, students come to understand the two forces of suspension bridge design, tension and compression.

4 Using a rich array of resources, 2nd graders delve into the time, place and socioeconomic conditions that prompted the bridge's construction.

5 The study often leads students to other explorations such as the East River and transportation.

"The Brooklyn Bridge incorporates so much," said Early Childhood Director and Hoboken Assistant Principal Cara Natale. "It's math and science, history and art, individual and group work. All of these components converge in this very ambitious project that brings the class community together one last time before they move on from blocks."

The Hard Work of Cooperation

Perhaps the most challenging and rewarding part of the study is the next-level cooperation attained when students are tasked with the reconstruction of a single structure. Imagine a classroom of motivated seven- and eight-year-olds, all brimming with different ideas on how to construct a bridge that complies with the laws of physics. "The bridge couldn't be built if students didn't have strong communication skills," observed Lindsey. "They really have to listen to one another, take suggestions and come to a conclusion on a plan. Then, they have to figure out what worked and what didn't. If students haven't been practicing these skills from PreK all the way up to 2nd grade, there would be 17 different Brooklyn Bridges."

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Much of the negotiation and consensus occurs in small groups. The reconstruction portion of the study involves four committees: Caissons, Towers, Cables and Roadways. Lindsey and Cara emphasize that trial and error is central to students' learning. The Tower Committee, for instance, may test several ideas before they hit on the right types of support for the suspension bridge to remain steady. "They build the towers a couple of times," explained Cara. "And the teachers really serve as guides throughout the process. We're not telling students *how* to build the bridge. We want them to try things out for themselves, figure out what's not working, ask good questions, reference books and other materials and make adjustments."

Research and Writing

Bridge construction is done one committee at a time, so when students are not building, they conduct individual research, write and edit several drafts of an expository paper and plan a presentation. Each 2nd grader focuses on a topic from the class timeline which could range from caisson disease, the condition that afflicted many workers and even chief engineer Washington Roebling, to a 19th century invention that influenced the Brooklyn Bridge's design.

"We don't just build a bridge," stressed Lindsey. "We explore all of the really interesting aspects of the bridge and gather a great deal of in-depth knowledge." When 2nd graders welcome parents and other classes to Brooklyn Bridge Day, they are all experts in one facet of the structure, because the process allowed them to take charge of their learning. "That's something that follows students through all the grades at Stevens, whether it's math, science, social studies or history," Lindsey added. "Students become very knowledgeable on a topic, and they are able to express information in a way that demonstrates, "I know this, and here's why.'"

No Two Brooklyn Bridges Are Alike

As the interests and focus of students evolve from one year to the next, so does the masterwork. No two Brooklyn Bridges are ever alike. One class wanted to simulate the science behind cable suspension and used lighter roadway material to make the experiment work. Another bridge reflected students' fascination with historical detail and included replicas of the lanterns used in the 1880s to light the structure. The skyline 2nd graders create as a class can also vary, from an epic poem about the Brooklyn Bridge to a documentary film using technology and multimedia tools. Each unique way students express their learning represents their understanding of the Brooklyn Bridge and its connection to modern society.

"The skills they develop in the Brooklyn Bridge project are so translatable as they move up at Stevens," said Cara. Intermediate and middle school students are confident sourcing information, writing a research paper or persevering through a challenging science experiment, because they were introduced to these skills in an appropriate way when they were younger. "The curriculum is designed to meet their level of understanding in order to build those deeper skills," Cara added. "We're lucky that we can do that."

Experiencing the Push and Pull of Immigration

What factors push people to emigrate from their country of origin? What circumstances pull or attract people to a new country? 3rd and 4th grade students at Stevens conduct a yearlong study of immigration by examining the push and pull factors of migration. They research and explore different periods of migration to the United States, create family histories and visit the Tenement Museum on the Lower East Side of Manhattan.

The study culminated with an Ellis Island simulation in April. Students were grouped into families and prepared personal histories and back stories for the simulation that replicated many of the policies and procedures immigrants underwent when they entered Ellis Island in the early 20th Century. Baggage was weighed and checked by inspectors before departure for the U.S. Following their arrival, students and their families went through medical, mental and document checkpoints.

Fourth grader Mia Golden adopted the persona of Isabella Milan, an Italian immigrant with a husband and two children. She was surprised when Isabella was permitted to enter the U.S., but the rest of the family was told to stay behind. "We should have looked closer at our documents and given the same information," she said. "When we were asked where we would stay, one family member said Manhattan and another one said Brooklyn." Mia thought about what she would do next as an immigrant in a new country. "I think I would try to find a job and a place to live," she said. "I'd also try to find someone I know, so I wouldn't be so lonely."

Head Teacher Sarah Schultz said the firsthand experience informs and deepens students' understanding of migration, in the past and present day. "It gives them the opportunity to see immigration through their own eyes," she said.