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## STEAM Blends Science and the Arts in Public Education

Schools are teaching the arts along with science and math

By Sophia Hollander

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*Janasia Smith, 13, works on building a camera in her photography class at MS 534 in Brooklyn.  
Craig Warga for The Wall Street Journal*

Students at MS 534 in Brooklyn faced an unusual assignment in their photography class: They had to build their own cameras.

The pilot program in the public school is part of a growing national push to blend science and the arts—subjects that, at times, have seemed locked in a zero-sum game for school funding.

Now, a coalition of educators, artists and scientists are proposing a different approach to science, technology, engineering and math education, commonly known as STEM: Add the arts and make it STEAM.

Eighth-grade students in Brooklyn are learning to build cameras and getting practice composing images as part of a new class that combines technology and the arts.

"Apple is successful because it's not just technology—it's at the intersection of design and technology," said John Maeda, president of Rhode Island School of Design, which is leading the advocacy effort. "Innovation needs the arts education component to truly flourish."

The idea has taken hold.

Earlier this year, a handful of members of Congress formed a bipartisan STEAM caucus, with the goal of drafting and passing legislation to incorporate arts into STEM efforts. There are now more than 50 members representing more than 20 states.

This fall, Stanford University began requiring all undergraduates to take two units of "Creative Expression" classes, including design, dance, music, fine arts, drama or creative writing.

Sesame Street officially expanded its STEM-themed programming to include arts last year. It was a natural fit with young children, said Rosemarie Truglio senior vice president for global education and research at Sesame Workshop, which produces the television program.



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"The arts is part of their being—they're singing, they're dancing, they're moving their bodies," Ms. Truglio said. "It became apparent that there are so many science and math lessons as they're using the performing arts."

One episode used the story of "The Three Little Pigs" to talk about construction principles, technology and math. Ultimately, the pigs attach wheels to the house to escape.



*"Students Learn the Art of Building a Camera": <http://bit.ly/CAEWSJVideo>*

"That's called innovation," Ms. Truglio said.

In November, Blue School in Manhattan, hosted a conference on STEAM that drew more than 200 educators, including some international participants.

The private school, for prekindergarteners through fifth-graders, was founded by the creators of Blue Man Group, a theatrical troupe that performs its wild, wordless shows in the U.S. and abroad.

As performers "we were living STEAM," said the school's co-founder Matt Goldman, who worked in software production before forming Blue Man Group. "It was almost, for us, like a science show, a science fair just put together with these bald blue characters."

They used the mathematical concept of pi to calculate wood dimensions for the group's first drum, ultimately consolidated the lighting, sound and special effects into a single computer—unusual for 1998—and engineered feats such as scaling walls of the theater.

When three founders and their partners started the school in 2007, they promoted that multidisciplinary approach and hired teachers who shared that philosophy, he said.

"The technology kids have now is the worst technology they're ever going to have in their hands so we need to give them opportunities to take things apart and put them back together in connection to solving problems in the world," said head of school Allison Gaines Pell.

The push to incorporate arts into STEM comes as some districts see cuts to arts education. An analysis by The Center for Arts Education, a nonprofit and advocacy organization that promotes arts programs in New York City public schools, found that city schools lost 69 art teachers from 2006 through 2012—even though the system grew by 304 schools during that time.

A department spokesman said principals have been empowered to tailor arts programming to their students, "which includes incorporating rigorous, standards-based arts education into their STEM offerings in new and creative ways."

Ms. Truglio of "Sesame Street" took issue with critics who contend that arts proponents are using STEAM to stay relevant in a world that appears to be shifting toward science.

"It's about giving the arts the proper significance," she said. "We're very proud that we have a STEAM curriculum and it's integrated—it's not an add-on."

At MS 534, the camera project was a collaboration between CAE and Shree Nayar, a computer science professor at Columbia University.

Mr. Nayar spent about four years developing the cameras—and an accompanying website—as a side project to his academic work, which includes developing cutting-edge cameras.

The idea is "to use the camera as bait to draw the user in and then expose them to as many concepts as possible," he said. "One kid may come away being drawn to the sciences, another one may take photography."

Officials at CAE saw a natural fit. "The idea is to provide the arts where kids would not get them and to provide entry points into science," said Jerry James, the group's director of teaching and learning.

The project mirrored the broader range of skills required in the real world, he said.

"There's only one way to put a camera together but there are infinite ways to take a picture and infinite ways to interpret a picture," Mr. James said. "On one hand you have logistical stuff to work out and on the other hand you have imagination."

On a recent afternoon, the eighth-graders in Brooklyn hunched over the camera kits—clutching screwdrivers, fiddling with gears and trying to slip tiny springs into place. Working in pairs, they consulted instructions and diagrams of all 38 camera pieces (including spare parts) neatly outlined on the back of the box.

They grimaced because the pieces didn't fit easily, but persisted.

"It makes you feel like you did something on your own," said 14-year-old Keenan Dukes. As he plugged in the final piece of the camera, he jumped up and started to dance.

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