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Got Science?

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At 4 PM on a spring Monday in Harlem, 3rd and 4th graders are filing into the yard of Thurgood Marshall Academy Lower School, carefully balancing basins of water. Soon they're elbow deep in suds, mixing a soap and glycerine solution for an after-school lesson in "bubble science." It's from a curriculum called "After-School Science Plus," which shows educators in after-school programs how to use inexpensive or household objects to lead science activities, including one called "Building with Wonderful Junk."

In this exercise, kids consider air volume, surface tension and adhesion as they're blowing bubbles bigger than their heads. Watching the Thurgood Marshall kids slosh in solution and blow giant bubbles through their hands, teacher Pamela Patterson Moore predicts, "They're going to ask if we can do Science Plus again tomorrow."

In a recent survey of nearly 800 after-school programs in 36 states, the nonprofit [Coalition for Science After-School](#) (CSAS) found that 88 percent of programs now offer science activities. That's the good news. So is the fact that 80 percent of after-school program leaders say it's important to offer science. The bad news, say coalition leaders, is that many after-school educators are using whatever activities they can find in a Google search. Access to high-quality curriculum and staff training has yet to catch up to interest.

Too many after-school program leaders remain unaware that institutions including NASA, the National Science Foundation, and 4-H have been developing and disseminating deeply appealing after-school and summer science curricula in recent years. Or that they can find vetted after-school science projects for any age in an [online consumers' guide](#). Or that programs now have easy-to-use evaluation tools to measure the effectiveness of their science offerings, gathered in this [database](#). Or that non-science professionals can be trained to delight kids through curricula such as "After-School Conservation Club," developed by United Neighborhood Houses, TASC and the New York State Department of Environmental Conservation.

In the LEAP after-school program at PS 163 in Manhattan, third grade Conservation Club members recently created a butterfly garden from a patch of weeds behind their school on West 97 Street. "So many kids in cities don't even know they live in the natural environment," said Sylvie Schlein, an artist with an interest in science who led the gardening project. By 4 or 5 in the afternoon, she said, when kids' attention spans are running short, hands-on science can strongly appeal. And if kids can get into the dirt, they're all the happier.

One recent day, as her group was weeding behind the school, a couple of boys began to use the handles of their magnifying glasses to pound the weeds on rocks. They noticed the weeds oozing green. Ms. Schlein pulled a gardening book from her bag and suggested they figure out why. A few minutes later, they had an answer: chlorophyll. The boys stuffed the tattered weeds into their backpacks to bring home to show their parents.

Though the appeal of such activities might be obvious, leaders in after-school science credit the expansion of this movement to three over-arching factors:

- Science-related challenges, such as climate change and reliance on fossil fuels, are at the forefront of the national conversation, and young people are intensely interested
- The after-school field is more actively trying to build on school-day academic learning, with organizations including the National Afterschool Association making science, technology, engineering and math (STEM) a priority, and major institutions backing research and promising projects
- Scientific literacy is no longer just an academic concern but also a social and economic one. Girls, kids of color, and kids without wealth will grow up to dominate the American labor force, but they are the least well-prepared to enter the most stable and high-paying careers – those in fields like technology and engineering.

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How many ways can you sort beans?
Danica Goyens-Ward leads a classification exercise.

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For the Noyce Foundation, whose goal is to grow the number of American kids who go on to pursue STEM careers, "We got into supporting science outside of school because our trustees could not see kids getting turned on to science in school," the executive director, Ron Ottinger, said recently. "If a young person hasn't stated by the end of 8th grade that he or she wants a science career, they're not likely to pursue it."

"After-school is the greatest opportunity to get kids engaged in science or anything else," Eric Jolly, president of the Science Museum of Minnesota, said at a recent institute TASC organized for New York science and education leaders, with support from the [Noyce Foundation](#). Considering how much time kids spend neither sleeping nor in school, Mr. Jolly said, "Forty-six percent of their lives are un-programmed by anybody except Xbox."

Kids must have both interest and capacity to pursue demanding STEM majors in college, he told leaders gathered for the institute. Schools can build capacity through rigorous math and science coursework, including algebra in 8th grade. "Getting young people engaged in science – giving them a sense of efficacy, a belief that they can achieve – that's what you can do after school," he said.

Linda Curtis-Bey, director of science and mathematics for the New York City Department of Education, suggested at the institute that to achieve the greatest synergy, after-school programs should offer hands-on science activities that match the grade-by-grade scope and sequence of schoolwork.

The first challenge, many science proponents suggest, is to get good curriculum into the hands of after-school program leaders, and to pair curriculum with training for the mostly part-time after-school workforce, few of whom have math or science backgrounds. That's been the TASC approach, providing four varieties of science curricula and extensive staff training to 55 New York City daily after-school programs during this past school year.

The Noyce Foundation is supporting the development and evaluation of several models of informal STEM learning. One is the TASC model, which infuses science into comprehensive after-school programs that offer many kinds of enrichments. The very kids who most need a push toward the STEM disciplines are the same ones who attend these programs, according to a recent Afterschool Alliance survey, which showed three-quarters of all kids who attend after-school programs in New York State live in families with limited incomes.

Mr. Ottinger said, "There's a lot of promising experimentation going on with organizations that have science as their mission, like 4-H or Girl Scouts or Girls Inc. Then you have organizations such as the [New York Hall of Science](#), and 300 or so museums or other institutions like it across the country, which are starting to work more intensively in after-school to identify the key characteristics of effective programming.

"If we look out over four or five years," he added, "I would hope we would have identified three or four models that work best" in various settings and different kinds of school systems, as well as after school and during the summer. "We want to back those models that can scale up, with public support."

The next hurdle, CSAS Director Jason Freeman suggests, is getting parents on board. A poll conducted by the organization Public Agenda suggests parents are not clamoring for more math and science after school. "My interpretation of that is that when most people hear about science and math after school, they're saying, 'You want my child to spend another hour in a classroom with a lecturer?'" Mr. Freeman said.

"Our challenge is to help parents understand that science after school should be thought about more like music and art and basketball. It's about experience and discovery, and it's just as much fun as drama or sports." Especially when it involves suds or soil.

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In what used to be a patch of weeds, third graders plant a butterfly garden.

