

Engineering 101, With Acting Lessons and a Touch of Drama

The Wolf Trap Institute for Early Learning Through the Arts helps teach science, engineering, technology and math to area children.

By [Alan Neuhauser](#) | Staff Writer May 10, 2016, at 12:00 p.m.



Jennifer Cooper, right, works with teaching artists who help promote STEM through the performing arts. COURTESY WOLF TRAP

The monkeys were on the loose again. They'd escaped the local zoo, ransacking the food court and terrifying the guests – and it was the third time in a week.

At a loss, the head zookeeper turned to a team of local experts: a classroom of preschoolers.

They blocked up the enclosure with bricks – which they discovered made the monkeys sad. They tore down the bricks and planted new trees – which pleased the monkeys, but abetted more escapes. Finally, using engineering, teamwork and tools in the classroom, the students devised a lasting solution: a series of nets and bars that kept the monkeys both happy and hemmed-in.

This is one of the scenarios dreamed up by Wolf Trap, a national park for the performing arts outside the nation's capital, to teach science, engineering, technology and math – or [STEM](#) – to the nation's children.

For more than 30 years, the center has teamed with local schools and teachers to incorporate dance, puppetry, art and drama into the nation's classrooms. Teaching artists typically visit classrooms over the course of eight weeks, working with students and helping teachers plan lessons and get into their roles as actors.

"The performing arts bring joy into learning and give children an excitement and a reason to really care about the subjects," says Jennifer Cooper, director of the Wolf Trap Institute for Early Learning Through the Arts. "Children are engaged; they're using all their senses."

Cooper is speaking at the [U.S. News STEM Solutions Conference](#) in Baltimore on May 19. She recently spoke with U.S. News ahead of the panel.

Here are excerpts of the interview, which was edited for length and clarity:

How does STEM factor into your work at Wolf Trap?

We use the performing arts to support children's learning of science, technology, engineering and math because we know that when you use the performing arts to teach these subjects, not only are there wonderful connections, but children learn better – children are really able to grasp the concepts through the performing arts.



Jennifer Cooper is director of the Wolf Trap Institute for Early Learning Through the Arts. (U.S. STEM SOLUTIONS, 2016)

What is it about the arts that's fostered those connections with STEM?

In early childhood, it's all about problem-solving and teaching children persistence and "stick-to-itiveness" and persevering.

So the teacher becomes the zookeeper and uses performing arts to come up with a solution – designing an enclosure for the monkeys – and they care about it because the teacher's created this fantasy world. That methodology they're using is called engineering success: determining what the problem is, coming up with a plan or solution, trying out that solution, looking at if it worked, if it didn't work using the information that you got and trying again. That strategy can be used in a lot of different scenarios.

We bring a teaching artist into the classroom to help the teacher learn how to facilitate these dramatic play experiences or music experiences or dance experiences, so the teacher will be able to use the arts to teach whatever subject – in this case, engineering – to her children.

How is the program's success evaluated?

Children who participated in the Wolf Trap program did better in their math scores – it was equivalent to 26 to 34 additional days of learning for those children – as opposed to children who did not participate in the program.

The results also showed that the teachers were using the strategies after we left the classroom. That's what we want: We want teachers to feel confident in using the arts to teach STEM concepts.

So much attention recently has been aimed at bringing more women and minorities in the STEM fields. How is the program at Wolf Trap addressing this?

Our goal with the equity issue is to make sure the program is being offered to as many children as possible and make sure it's being offered for early childhood.

Children who enter kindergarten behind stay behind, children in an economically disadvantaged place before they enter school are continually behind. That's what we want to stop before they get into kindergarten.

What's really wonderful when you go into a classroom is when you see all children are participating. Sometimes the arts can really level the playing field because of the multiple modalities that are being used.

In scenarios like the zoo example, do teachers make the connections with science or engineering explicit – even going so far as to say, "This is an example of engineering?"

You're using vocabulary that's accurate, and you're assessing that children are understanding the concepts.

We don't want teachers to see the arts as something extra; it's something intrinsic that can help them teach other goals. They might be learning a pattern – early childhood patterning is something that's very fundamental step toward algebraic thinking, and dance and patterning is a perfect fit because a pattern is a fundamental part of dance. So they create an AB dance pattern, and they use that same terminology for young children.

What's surprised you in the nine years you've been involved with this program?

The beautiful thing about our program is that it really meets the teacher where she is to include the arts where she's comfortable. It's really exciting to see what teachers can do with it.

What's kind of surprised me is that our children have so much ability in them. It's wonderful to see how much our children can take and apply. Even in the cafeteria, one child was having issues with opening a milk carton and was about to talk to the teacher, and one of their classmates said, "Let's use engineering to figure this out." That's been beautiful to see.

Corrected on May 11, 2016: A previous version of this article incorrectly described the frequency of teaching artists' classroom visits and the link between Wolf Trap's early childhood arts education work and its affiliation with the national parks.



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