When STEM Becomes STEAM, We Can Change The Game

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I focus on collaborative problem-solving in K-12 STEM education.

Tomorrow is National STEM/STEAM Day, a day where we focus on inspiring kids to pursue science, technology, engineering, math . . . and art? As the head of an organization that focuses on preparing 100,000 new STEM teachers for our nation's classrooms, I get asked all the time what I think about STEAM. People assume I'm opposed, but the opposite is true. While the country doesn't have a need for more arts teachers, per se, we all need more STEM teachers to teach STEM in STEAMy ways. 21s century jobs require creative confidence, critical thinking, and collaboration. Children need 21st-century learning opportunities that are no different. When the arts are part c STEM, STEM can come to life and spark connections for many more students to engag creatively, critically, and confidently in their learning.

As Jan Cohen, the Founder of UrbanMath Trails, recently told me: "Not enough connections are being made between art and math."

We need all kids to have the STEM skills and agency to become the problem solvers ou world needs them to be. Our role as educators is to open as many doors as possible for students to get excited about learning and, specifically, STEM. Yet implicit bias and other structural impediments mean that we open fewer doors to girls, students of color and kids from low-income and rural communities. When they don't engage deeply in STEM, we all lose. But the arts have always been a haven for the otherwise marginalize and arts education connected to STEM can open many possible doors.

When we start to look, natural overlaps and places of connection between the arts and STEM are everywhere – and always have been. As Dr. Jenny Nash, Head of the Education Solutions Design Team at LEGO Education, told me, "A baker uses chemistr

A chemist develops the makeup, and a computer animator designs the on-screen speci effects used in the blockbuster movies we see in theaters. Experiencing STEAM subject in an integrated way is more authentic and representative of the world we're preparing students to enter."

The Mind Over Music program at the Phoenix Symphony in Arizona is cut from the same cloth. Their program, which pairs symphony musicians with classroom teachers and helps students integrate music into STEM, is reaping huge benefits. Average annu results show that when compared to control groups, Mind Over Music students score significantly higher in science and math compared with students who don't participate

Valerie Bontrager, Director of Education at the Phoenix Symphony in Arizona, says tha for these students, it's all about new ways of looking at STEM.

Phoenix Symphony cellist Mike D'Avanzo, investigates sound with 2nd graders by deconstructing a ... [+] PHOENIX SYMPHONY

"Those lessons elicit different entry points for th students, the teachers and the musicians," she said. "When the Mind Over Music students com to the hall for a concert to see the musicians at work, their orientation to the concert is connect to the experience they've had in the classroom."

At Explora, a science, technology and arts learning center in Albuquerque, New Mexico, learning is inter-disciplinary from the word go. Paint and spin-art might be used to explain centripetal force, or kids might apply principles they've learned in math and science to build a kinetic sculpture.

"The arts allow us to expand ways of knowing and learning to inspire more learners," said Tara Henderson, Explora's Director of School and Community Programs, drawing from the expertise and experience of her whole team. "An art-inclusive approach to STEM strengthens creativity and ingenuity in all areas," she added.

Some say that architecture sits at the exact equilibrium between the arts and STEM, where artistic vision and aesthetic sensibility are brought to life within the constraints of what is structurally and materially possible. Frank Lloyd Wright once said “the mother of art is architecture.” Wright credits plain wood blocks as his original material. The blocks, developed in the 1830s by Friedrich Froebel, a German educator and the inventor of kindergarten, were STEAM long before the acronym, helping children learn about geometric forms, mathematics, and creative design.

Explora student mid-construction EXPLORA

Children learning at the Bay Area Discovery Museum ASHLYN PERRI

This union of design, art and STEM is alive and well at the Bay Area Discovery Museum: “At the Bay Area Discovery Museum, all of our arts programs have a specific link to STEM thinking and intentionally engage children in the design thinking process and emphasize creative problem solving,” said Janine Okmin, Director of Education. At the Bay Area Discovery Museum, Okmin explained, they “intentionally weave STEM and the arts together in lessons and projects to refute the narrative that there is dichotomy between the two, or that you can only be good at one or the other.” Doing so “makes both more accessible and more relevant.”

Despite the opportunity inherent in blending the arts with STEM, “subject specific standards and assessments and scheduling create obstacles to teachers seeking to integrate in authentic ways,” Tom Peters, Director of South Carolina’s Coalition for Mathematics & Science at Clemson University, noted.

Learning at the iMAGINE STEAM Festival, a program of South Carolina's Coalition for Mathematics & ... [+] JACK ROBERT PHOTOGRAPHY

These examples speak to how art can spark an excitement about learning that goes beyond the artistic to embrace science, math, technology, and engineering. As is true in the best learning moments, a connection to art can ignite the drive for more learning across disciplines and motivate us to continue seeking knowledge, creativity, expressio – and new solutions.

"Weaving the arts into STEM offers learners and their teachers another legitimate avenue for meaning making, problem solving and expressing understanding," Peters shared with me. Dr. Nash concurred: "When we think about STEAM learning, we're really thinking about the wide range of skills students need in a changing world," she said. "With STEAM, students naturally see the endless possibilities and intersection points as they choose – even create – their own career paths."

From the child preparing for a dance recital, whose movements are an exploration of physics, to the math behind Mozart's Magic Flute, to the computer science and design

synthesis that creates that eye-catching logo, integrating the A into STEAM can be life-changing for all of us.

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