STEAM Ignites Learners' Energy

Art adds powerful processes to STEAM

STEAM-fired schools are surfacing across the nation with palpable energy. This educational approach has deep roots in child development (children learn through active engagement, exploration, and discovery) and parallels the way professionals in the fields of science, technology, engineering, art, and mathematics address real-world problems. STEAM takes learning "off the printed page" and intentionally transforms students from content memorizers to innovators who contribute original ideas and solve problems collaboratively.

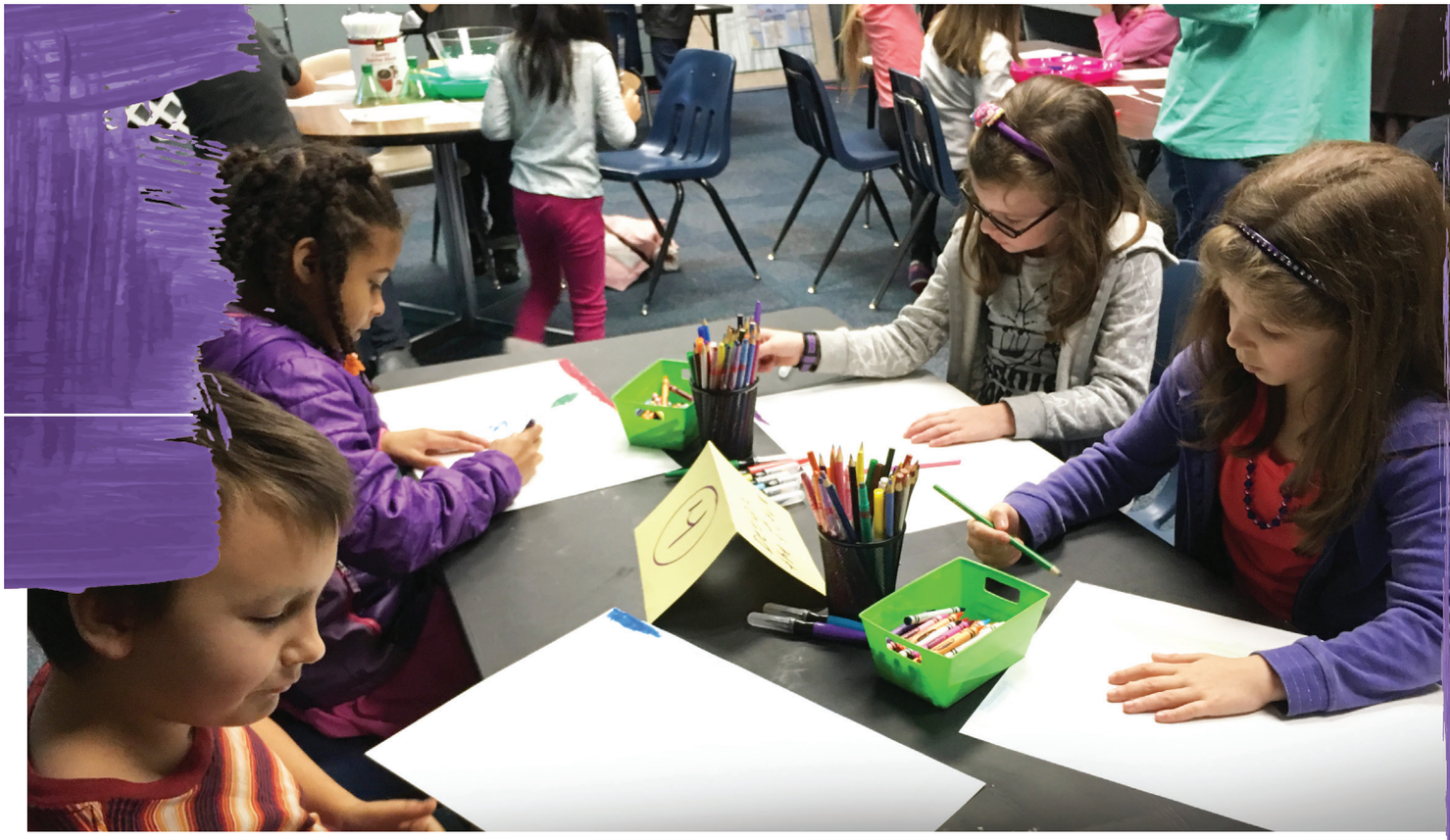
STEAM on the FAST Track

Debra McLaren, principal of Wolf Canyon Elementary School in Chula Vista, California, came to the field of education after her career as a performing artist. She knows firsthand the power of art to blend cognition and aesthetics. She refers to STEAM as the renaissance attitude that is shifting education from being content-driven to child-driven.

"STEAM schools experience a rebirth by focusing on what's really important," McLaren explained. "Children understand the purpose of each project and what it means to be an innovator and entrepreneur. STEAM moves schools away from the traditional assembly-line mentality and prepares students to be leaders." Students at Wolf Canyon Elementary are on the FAST track (fine arts, science, and technology)—an acronym McLaren came up with when the district asked her to open a new school for pioneers, a team of innovative early adopters. She said California's system of Local Control Accountability Plans has helped establish its intentional use of arts integration. "We embedded the commitment to the arts in all 46 schools in our five-year plans." Professional development and teacher collaboration were pillars of their STEAM plan.

At Wolf Canyon Elementary, design thinking comes alive as students reimagine an "object of the day." Five protocols are employed to make ordinary objects extraordinary: engage, explore, explain, evaluate, and extend. Students record their research and sketch their ideas in engineering notebooks. The interaction of form and function is debated as teams plan innovative improvements to basic objects. Some of the common objects students selected for this iterative design-thinking process include chairs, candles, writing tools, vacuums, glue sticks, and salt. They use a "think tank" collaborative approach in choosing the object by looking at what's happening in the world and why it matters to them. After identifying problems and possible solutions, students engage in the evaluation protocol. They assess artistic qualities of

Public School 174 – William Sydney Mount, Rego Park, New York



Bagdad Elementary School, Milton, Florida

their ideas as well as the structural aspects of each new proposed solution. Students contribute to the rubrics used to assess ideas.

"Children come to us as creative, curious beings eager to interact with their environment," McLaren noted. "Asking them to sit quietly and memorize answers is not consistent with everything we know about how children learn—nor are those practical skills for the real world. How many jobs ask workers to just listen and memorize? We must employ strategies that prepare kids for their future."

Igniting Exciting Learning

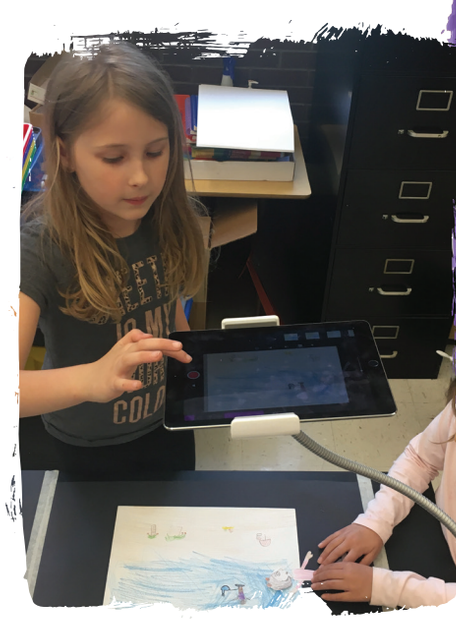
Bagdad Elementary School in Milton, Florida, is also a STEAM school with a unique acronym for its program: Project LITE—Lightbulbs Ignite. Teachers Excite.

What sparked the school's LITE program? Principal Daniel Baxley said teachers were feeling pressured by test scores and frustrated by mandates that seemed to pull the joy out of learning. He saw how excited teachers got while attending professional development on design thinking, and soon after, the LITE acronym came to him. "We want to ignite students and excite teachers. We want to invigorate teachers, not burden them," Baxley shared. He already is seeing results from the school's STEAM program: Test scores are up, discipline referrals are down, and there's been a 100 percent increase in parent involvement.

Students are using the design-thinking process to collaboratively brainstorm and reach consensus at Bagdad Elementary. Their projects focus on civic responsibility and community service. Students are designing robots, building energy-efficient greenhouses, and cultivating community gardens. They're also creating design challenges for each other as they explore the magic of flight. Baxley sums up the benefit he's most excited about: "Student leadership. Students conceive, design, and manage these projects. STEAM has built a sense of community that has elevated the role of learners as leaders."

Innovation and Invention

School leaders who have been implementing STEAM programs for several years are now being asked to share insights with others. Karin Kelly, principal of PS 174 in Rego Park, New York, reported, "Since the new Every Student Succeeds Act mentions art should be integrated into STEM, we get calls every day from other schools who want to know how we do it. I explain you can't really teach science without art and that all inventors are artists. I urge them to start with Leonardo da Vinci and think about the role of art and science in his work."



Acmetonia Primary School, Cheswick, Pennsylvania

In Kelly's school, students understand that design is important in making lives better—fulfilling a

function and doing that in ways that look and feel right. They have designed new backpacks, drinking cups, chairs, desks, and even a water-powered oven with the help of partners at Con Edison power company.

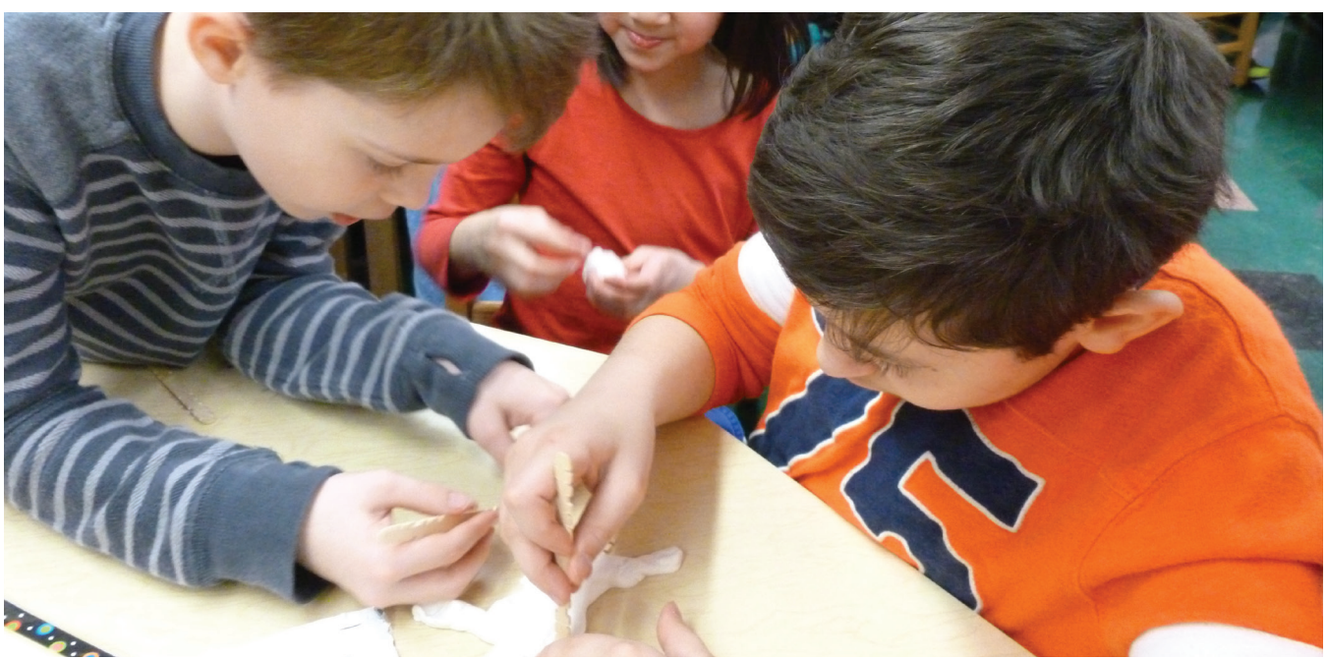
Every year, PS 174 hosts an invention convention, which is a fun feedback program, similar to the *Shark Tank* show, in which students try to convince mock investors to fund their ideas. A recent favorite design solution was Doctor Robot, a nimble technology-driven first responder that would arrive at a scene quickly, assess injuries, and communicate to hospitals so the wounded would get immediate help before an ambulance could arrive. Students use a six-step design-thinking process to prepare for the invention convention:

1. Define the problem;
2. Brainstorm solutions;
3. Create prototypes;
4. Conduct an eco-review and assess design/functionality;
5. Refine based on assessment; and
6. Plan commercialization (determine name, logo, patents/trademarks, and pricing).

Public School 174 – William Sydney Mount, Rego Park, New York

Beyond their schoolwide event, several grade levels have begun to enter into national and regional design competitions, including the Edison Challenge and ExploraVision. Kelly noted that other schools have asked her how PS 174 makes time for all this. "I explain, this is what we do," she said. "This is how we teach every core subject and content area. STEAM … is how we inspire this generation of learners."

Cheri Sterman is director of education at Crayola and vice-chair of the Partnership for 21st Century Learning.



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