The Interface

An Expressive STEM Activity

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The Interface: *An Expressive STEM Activity*

Computational Storymaking

"Expressive STEM storymaking invites participants to explore story creation with computational tools and materials, sometimes including traditional craft tools and art materials. Learners respond to stories of their choice by focusing on one or two major story elements, such as character, setting, or plot, often centering on early elementary storybooks. The goal is to stage a story or part of a story by inventing an original narrative, by transforming an existing narrative, or by responding to prompts from language arts, science, math, or social studies."

excerpt from
Justice S. & Assaf C.L. (forthcoming). Expressive STEM storymaking: Art, literacy, and creative computing. In Y. Cooper and A. Lai (Eds.), *STEAM Education: Intersections and Thresholds.* Brill/Sense.

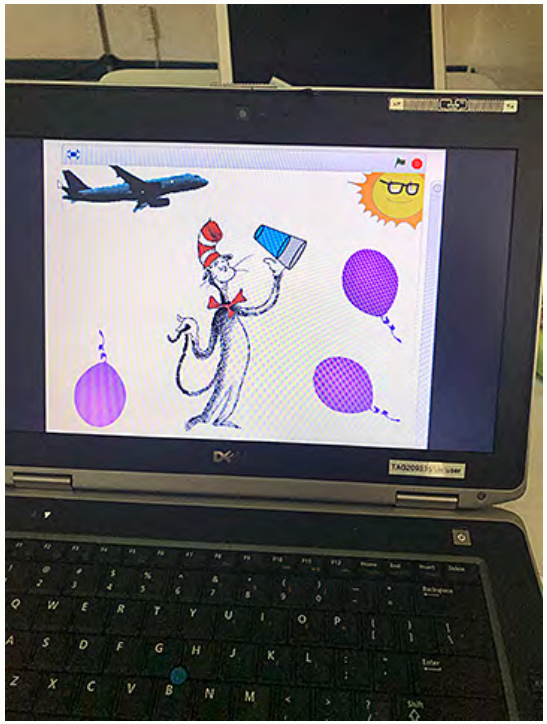
learning to engage—choose a book and stage an episode or transition point involving characters, plot, or setting

empowerment of curiosity through encounters with materials

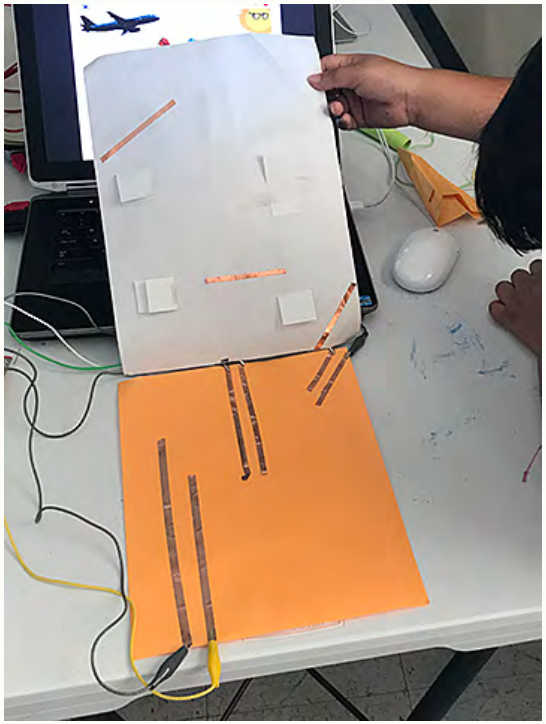
physical computing + storytelling = story**making**

children, adults, teachers
(pre-service, in-service, art, others)

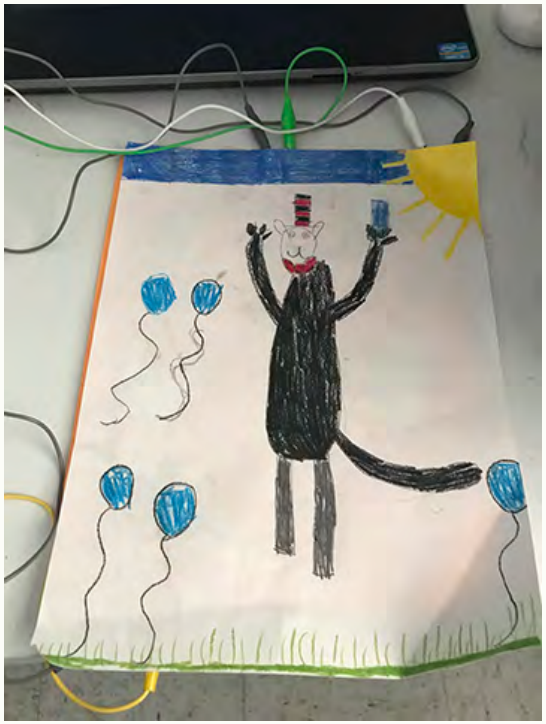
The interface activity — what we build:



Scratch

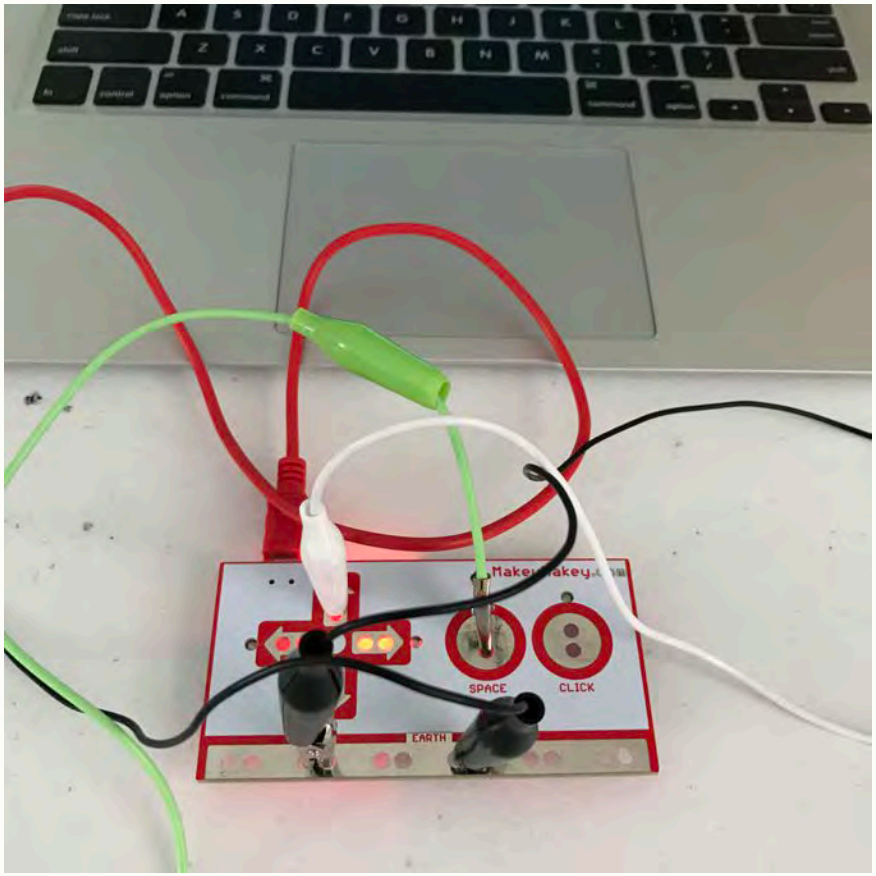


Switch



Draw

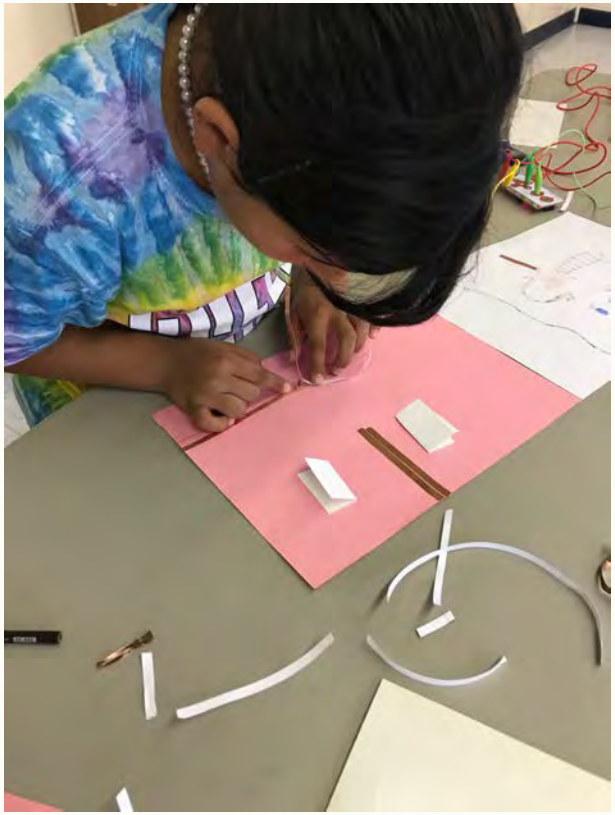
The interface activity — how it works:

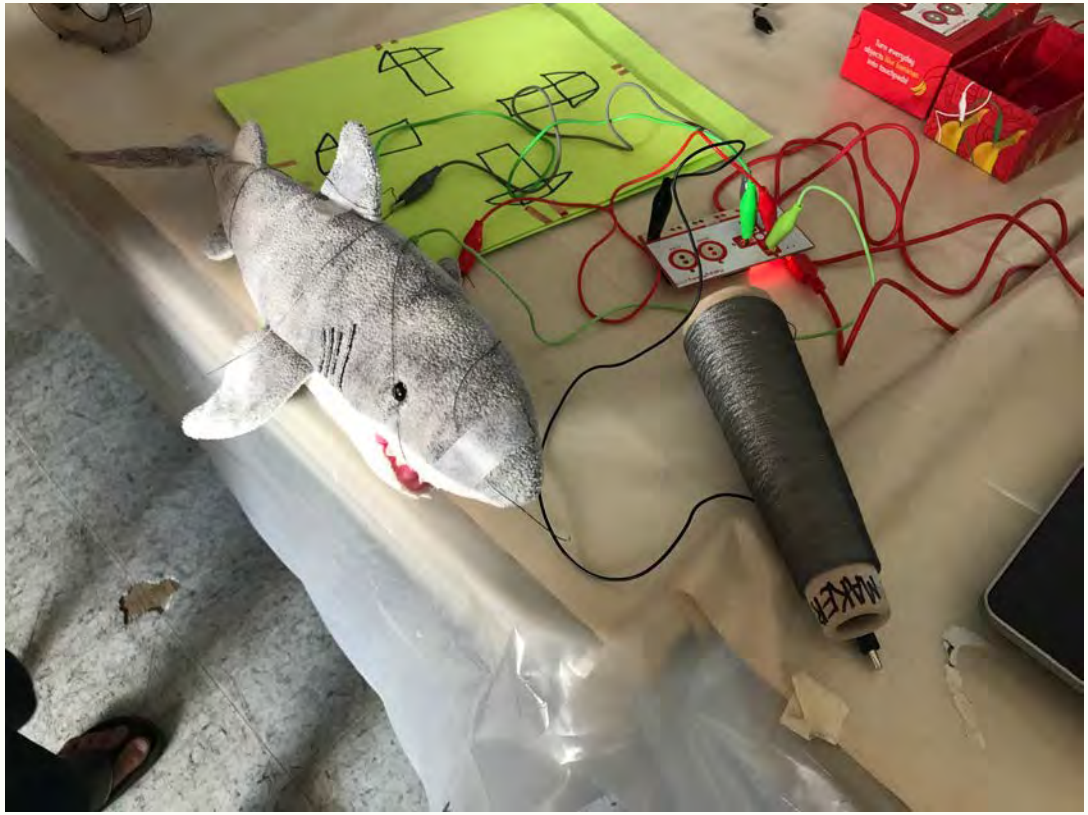


Microcontroller

(e.g., Makey Makey, micro:bits, hacked mouse, etc.)

The interface activity — how to build the switch:

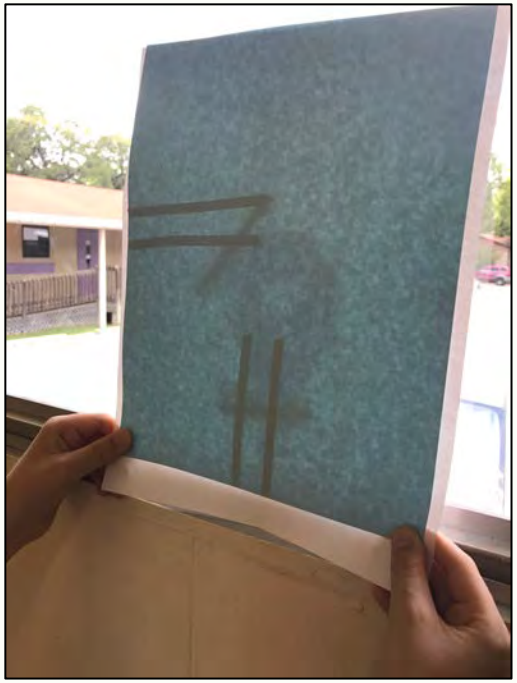




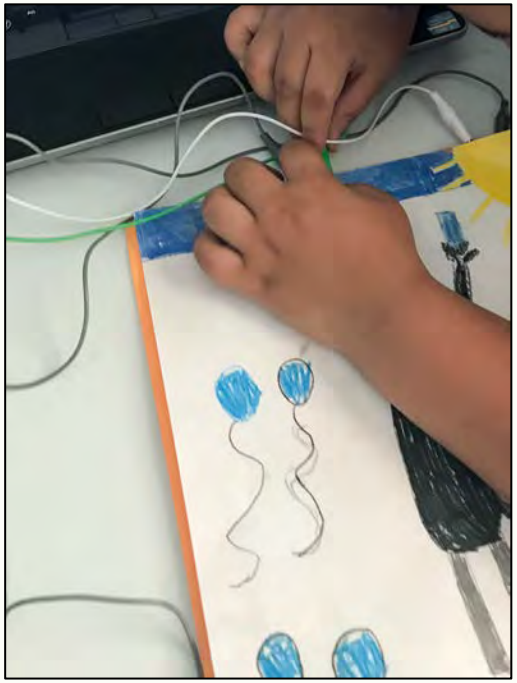
Make a circuit with craft electronic materials

(e.g., copper tape, conductive thread or paint, light gauge wire)

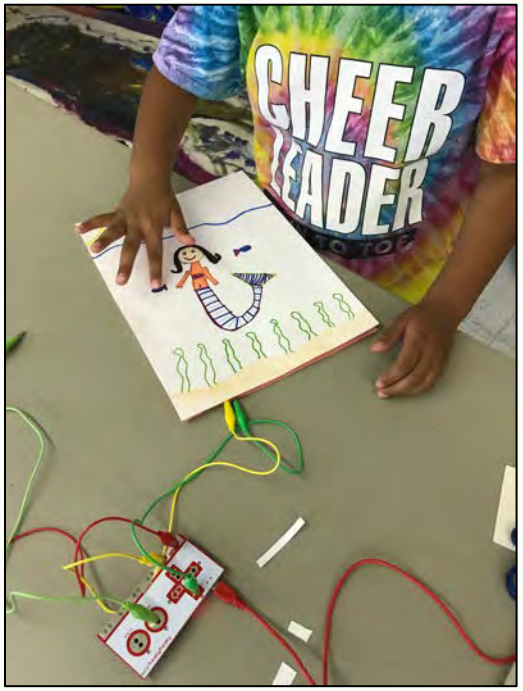
The interface activity — how to build the switch:



align

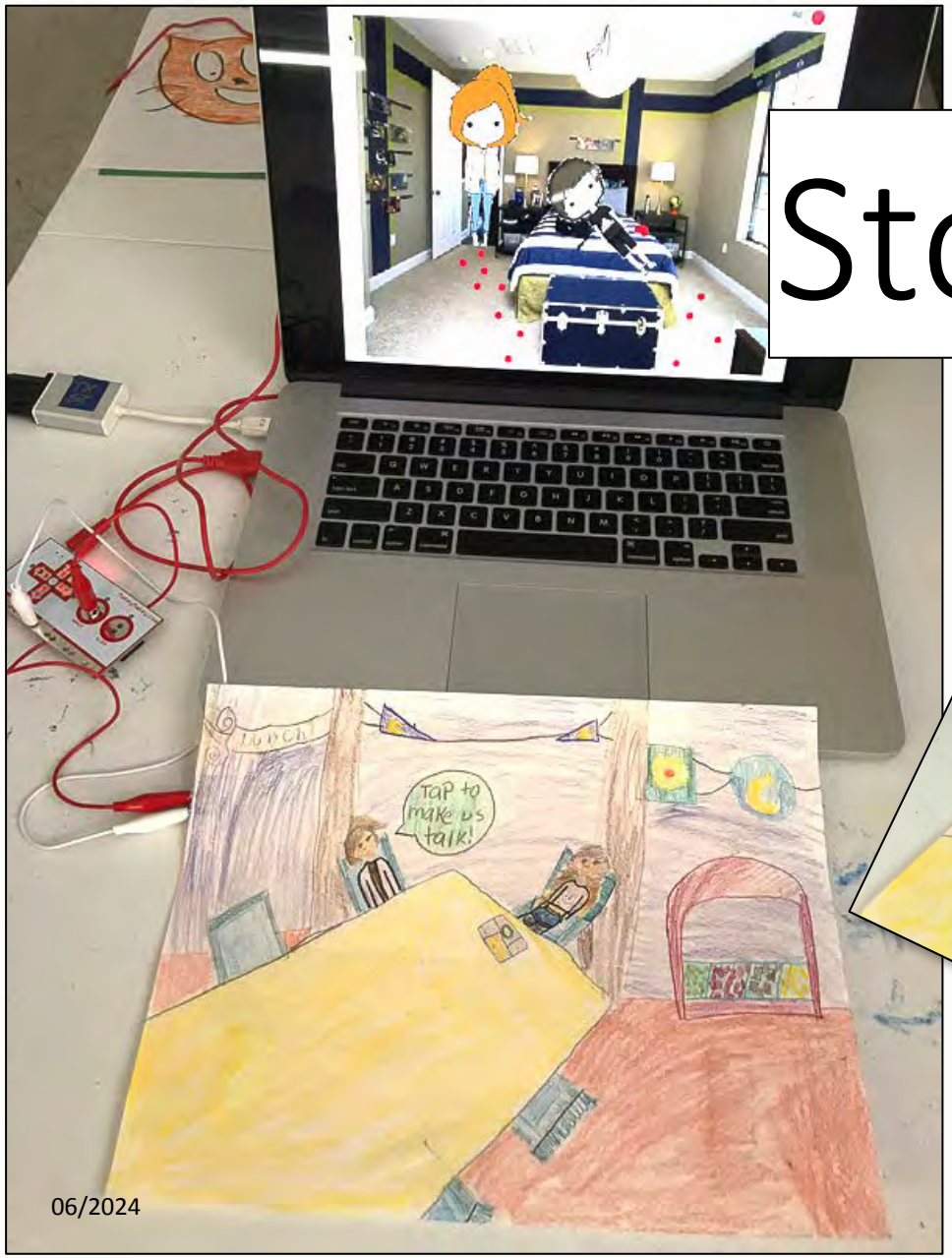


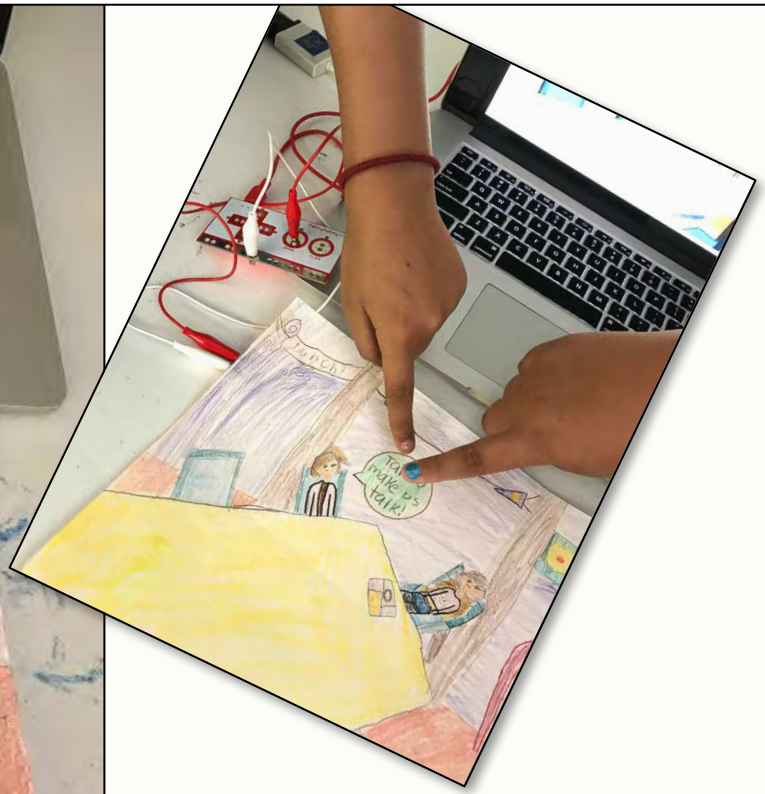
connect



test

Storymaking






Resources

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INTERFACE: THE TRANSFORMATIVE POTENTIAL OF COMPUTATIONAL MAKING

Media art education has begun to integrate new digital tools and materials in computational making activities. These activities leverage hardware and software from a wide swath of the contemporary craft landscape—from computer programming languages to microcontrollers. In referring to these activities as *computational* I point to Lorna Arnott's (2017, pp. 9-11) descriptions in *Digital Technologies and Learning in the Early Years*, where she argues that new digital materials are different from previous digital craft tools (digital drawing and painting apps, for example) because they enable users to make and manipulate data for creative and playful purposes.

It seems to me that this capacity to make and manipulate data offers transformative artmaking opportunities for children—opportunities that are within reach of most art teachers, even if they have no experience with computer programming. In this column I introduce an activity, known as Interface, that my preservice art education students at Texas State University and I developed for early elementary through high school art classrooms.

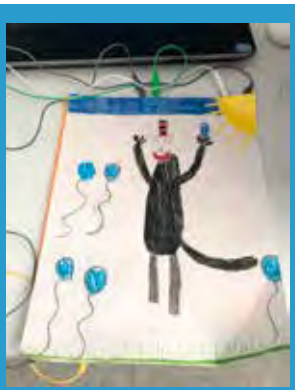
An Interface art activity combines drawings or collages with computer animations in an interactive assemblage. Components are sometimes introduced separately—programming first and picture making last or vice versa—but we occasionally present everything more or less simultaneously, like a buffet. Regardless of sequence, defining output loosely is important. Recently, students in grades 2-5 made Interface collage animations that included fish, cars, cheerleaders, vacations, and Father's Day. One student sketched a controller and connected it to a game he had made. Even as novices with these tools, students impress us with their fearless and creative engagement.

For teachers who are novices in computational making, multiple entry points can guide the way.[1] Regardless of the starting point, making an Interface interweaves three tools: computer programming, circuitry, and picture making. Since most readers of this column already understand picture making, the focus here is on the other two implements.

Computer programming is becoming more common in art education classrooms because of STEAM learning objectives, though many teachers have little experience with it. At Texas State University I teach preservice students to program with Scratch[2] because its colorful visual blocks invite beginners to make meaningful projects right away. Scratch may already feel familiar to you because its format has been adopted by other apps. Most importantly, children start coding with very little scaffolding, even if their teacher has no programming experience.

Interface also requires a low-tech switch built from circuit materials such as copper tape, metallic thread, and conductive paint, all of which are available in art supply catalogs. Creating a working circuit will remind you and your students of connecting flashlight bulbs and batteries, though the goal here is to connect a drawing to a computer animation via a microcontroller. Makey Makey offers microcontrollers that are popular because they mimic keyboard inputs, though they may be expensive for some schools at about $50 each. Other microcontrollers are cheaper (about $16 for a micro:bit) but with fewer outputs. DIY options include hacking old computer mice (about $1 in community recycling centers)—some simple tools and a little ingenuity can liberate the circuitry needed for an Interface activity.

Interface assembly is a trial and error process, no matter how many tutorials have been given, which is why my students and I rely less on step-by-step instructions and more on open-ended experimentation. As confidence increases, children follow pathways that interest them, embarking on multiple rounds of debugging, which can be frustrating but also invigorating. For example, when pressing the spot in a drawing that contains a switch, the circuit should close and a signal from the microcontroller should launch the animation. If it works, laughter erupts across the classroom. And if it does not work, the failure registers immediately, and another round of debugging begins. For children and their teachers, the smiles and cheers are hugely satisfying, but knowing that they have crafted a functional computer interface is electrifying. ■



This drawing includes interactive points at the sun, the hat, and the balloons. When touched, the pressure closes a circuit that launches a computer animation. The drawing, the circuits, and the animation were made by a 2nd grader.

Reference

Arnott, L. (Ed.) (2017). Digital technologies and learning in the early years. Thousand Oaks, CA: Sage.

[1] http://seanjustice.com/interface/
[2] https://scratch.mit.edu

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