

Transformative Learning

Written by Nancy Otero

We're launching
Make: Learning Labs



NANCY OTERO is the Director of Learning at Make:, and is a fan of laser cutters and AI. She has spent the last 10 years working with educational organizations designing environments that mix technology with project-based learning.

Project from FAB! — a lamp to help small kids fall asleep.

For humans, making is as natural as breathing. There is a history of 3.3 million years of making, told by the oldest hominid-made artifact we know. For my father, making is his way to relate to the world. So fixing, improving, creating, and exploring was how he would spend his time at home during my childhood. Even though I wasn't invited to as many projects as my brother was, I participated in enough of them to see the world as something that could be made. I could imagine cutting holes or adding electronics to the stuff around me as a default nature. I didn't have to choose making; it was mandatory in my family.



Students at Portfolio School, NYC

Nancy Otero, Doug Schachtel

Making showcases not just what you know but what can you do with what you know.

Knowing the value of making, I was very excited to join *Make:* this year. For several months I have been working on developing **Make: Learning Labs**, a modular program designed for small groups of young people 16 and older. This is a program model that we will share and hope to have it replicated by partners. The program provides an alternative to traditional education programs that helps young people discover what they are interested in and what they can do. It will encourage students to experiment with new ideas and new skills. The program can help them become good learners who can work in a creative and collaborative environment.

The curriculum has an online component that can be done at any time that is convenient for the participant, and an in-person lab component where participants work together and individually on different platforms to create projects (though these components can run online during Covid).

Here's why this program is so important now:

- According to a recent survey done by ECMC of high-schoolers, 74% of the Z generation believe a skills-based education (e.g., trade skills, nursing, STEM, etc.) makes sense in

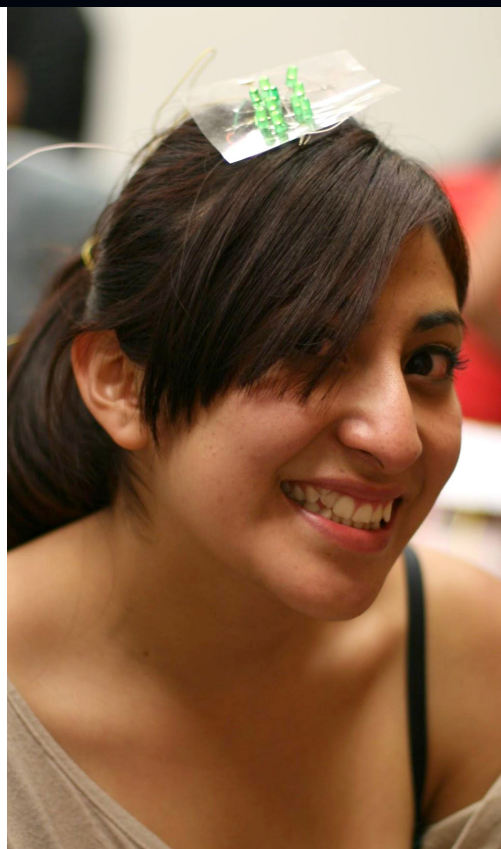
today's world, and 63% said that the top place to learn is a hands-on lab.

- As an example, NASA's recruitment creativity test was used in a longitudinal study. 98% of children 4–5 years old score at the highest of the test, something called creative genius. By the time children were 10 years old, 30% scored those points; by 15 years old, only 12%. Just 2% of adults are creative geniuses. The more schooling, the less creative.
- Today 41% of teens haven't attended an online or virtual class since in-person school was canceled, and the International Labour Organization projects 273 million young people in NEET (Not in Employment, Education, or Training) in 2021.

Without a viable alternative, many young people are at risk of dropping out, taking a path where the opportunities for learning are fewer, and limiting their career in the long term. Make: Learning Labs is a program that can engage young people and develop agency around the world.

How Make: Learning Labs Works

This new initiative provides a learning trajectory to help participants gain confidence in their own ability to think and create. The program has



FAB! Project: Shocking-alarm clock.
Think twice before you hit snooze!

Nancy Otero, Gabriela Calderon

Participants of the Makers in Residence program in Mexico.

Learn how to make projects and you'll see implementable solutions everywhere

three phases: 1) immersion in making; 2) a deep dive to develop skills in software, electronics, and digital fabrication; and 3) independent projects that applies the skills and knowledge to culturally relevant real-world problems. Participants will learn to use a problem-solving framework, such as design thinking, and project management tools for agile methodologies such as Slack, Github, and Asana. Participants will meet with mentors to talk about their interests, and develop a custom learning plan for the next module.

Throughout the program, students will be expected to develop projects, starting small and increasing in complexity, both on their own and in collaboration with peers. The program will

culminate in a capstone project that introduces the process of innovation. It follows a process that involves need-finding, contextualization, prototyping of several solutions, and iterative testing. This phase culminates with the students sharing a presentation and demonstration of the innovative solution. Students will develop and showcase projects on makeprojects.com.

Make: Learning Labs participants will have at least five projects for their portfolio that can be used, if desired, to apply to college or a new job.

We know about the many obstacles that schools and teachers face implementing making. That's why we are developing Make: Learning Labs with five main characteristics:

1. Creative freedom for anyone to design their

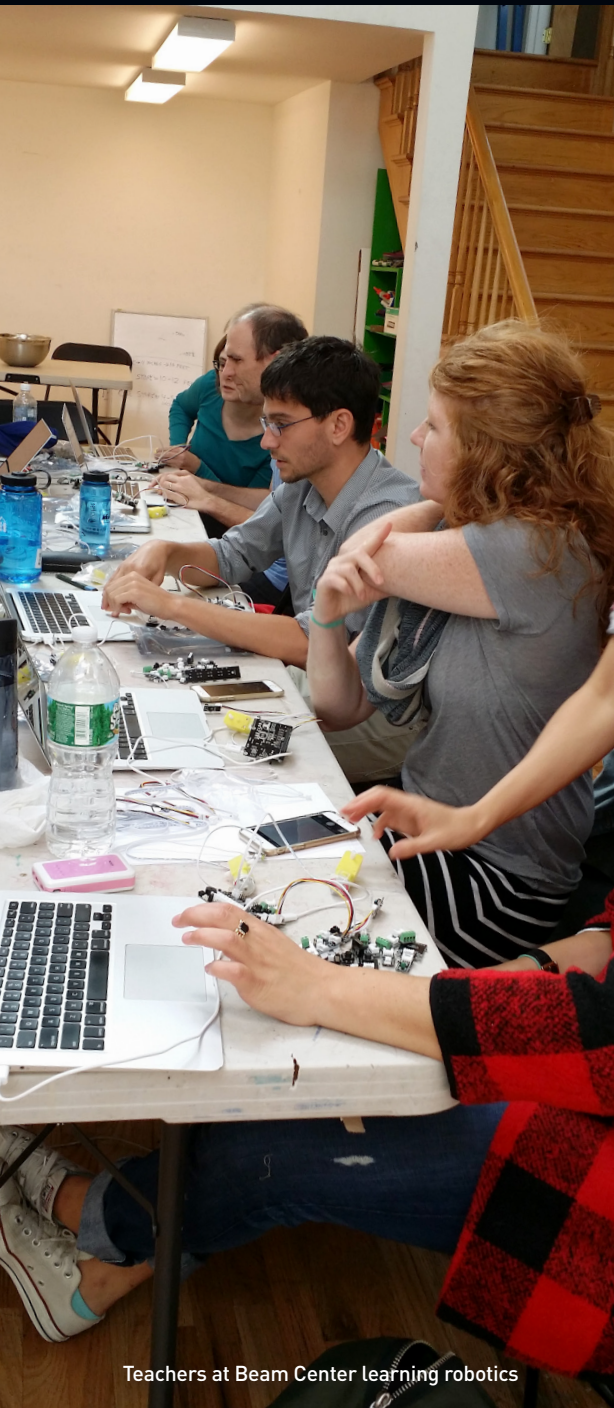
own activities, and get inspired by, use, or tinker with already posted making activities

2. A research-and-practice-based framework and developmental trajectory for problem-solving and project-management that binds together the making activities
3. A culturally relevant compass on the activities and pedagogy that guides the creation and implementation of making activities for inclusion
4. Professional development for facilitators and coordinators to implement the program
5. A platform to post projects, collaborate, and create a learning community

When we make, our flow of thought answers to the changes and feedback of the materials, tools and projects which we work with. These tools

and materials think in us, as we think through them. Learning how to use scissors makes the world cuttable; learning to code makes the world computable. Learn how to make projects and you'll see implementable solutions everywhere. We want younger people to think about the future and be able to make those thoughts a reality. Anyone can become a maker and any maker an innovator. The Maker Community rolled their sleeves and helped make supplies for hospital and essential works. This is a call for the Maker Community to help again, to support our young people to find their purpose and path to the future.

You can access more information about the Make: Learning Labs at learn.make.co. We are



Teachers at Beam Center learning robotics

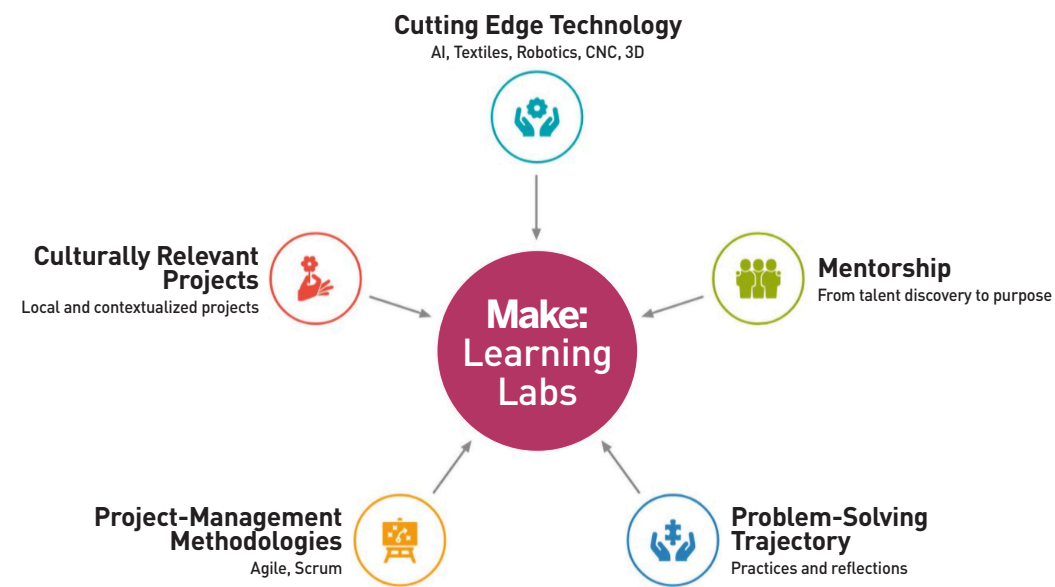
looking for partners that want to implement the program in their school, makerspaces, community centers, etc. Those interested can email me at learninglabs@make.co.

Launching the Labs

I've been combining making and learning for years, in both academic and professional settings, and I bring this wealth of experience and expertise to the Make: Learning Labs.

In 2012 as a grad student at Stanford University, through the magical Transformative Learning Technology Lab, I discovered educators that link making and learning, I was drawn to it immediately. I brought those lessons with me to Mexico, where, from 2013–2018, I co-founded and led FAB!, a non-profit that worked with high-school students from underserved communities. The goal was to give that group a useful activity to engage with. It ran as an after-school program, a custom program modeled after the Makers in Residence designed by Prof. Paulo Blikstein, who had brought the digital fabrication lab concept to Stanford (where I worked with him) and was the first to adapt it for secondary school instruction in the STEM fields. During the program, participants learned making skills, used design thinking to find a problem they care about, prototyped a solution using their new skills, and shared their project with the community.

After running this project for three years, I learned that these teenagers liked making and they can do incredible projects even without any previous experience or technical background. I witnessed students develop a device that could be installed in cars to measure a driver's cognitive abilities before being permitted to drive. The goal of this team was to avoid car accidents. This group of teens (some of whom only having just accessed a computer in their school lab) interviewed people, programmed an app, and connected the output of the app with



a microcontroller to block a car key. I was sold. My next question: How could one amplify the experience with academic learning?

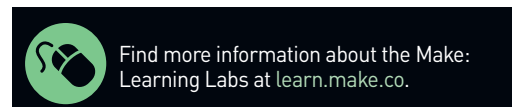
I went on to join the Beam Center in NYC in 2014 with the goal of bringing making to teachers. I created a program for public high-schools' teachers that would help bridge making and academic learning through project-based learning. Teachers partnered with artists and engineers to design big projects where students could apply the curriculum. The program grew and has reached thousands of students and more than 100 teachers. But those activities occurred a few times per year, even when the improvements in students' learning and engagement were visible. I started wondering if making was a complementary activity or its own way of learning. How would it look like for a school to turn all its curriculum into projects?

I had the opportunity to find out when I became the Founding Director of Learning Design and Research at Portfolio School in 2016, a project-

based learning independent micro-school in NYC. This was a dream come true. With the mission of redesigning schooling given everything we know today about learning, we eliminated tests, grades, 45 minute schedules, and created a learning framework where making became a tool to apply and internalize powerful human ideas. Through four years of this experience, I can say with certainty that making is a fundamental piece of learning, a piece that gives tangible form to a legacy of human ideas while adding personal meaning. For everyone, since kindergarten.

And now I'm so happy and excited to join Make: as Director of Learning, where I have applied all the lessons of this journey to launch Make: Learning Labs. We've spent months setting it up and look forward to connecting with you about it further. See you there. 🚀

Pilar Perez, Doug Schachtel



Making gives tangible form to a legacy of _____
human ideas while adding personal meaning _____