

## *Wood Shop Enters the Age of High-Tech*



*The maker space at the Rutgers Livingston campus offers a clubhouse ambience and high-tech tools. Credit Richard Perry/The New York Times*

By [John Schwartz](#) Feb. 5, 2016

You remember wood shop. You made that swan-shaped planter your parents pretended to like. And then you moved on.

These days, tinkering is a bit more high tech. The blending of technology and craft in tools like 3-D printers and laser cutters has made it possible for ordinary people to make extraordinary things. And many ordinary people, living as they do, more and more in their heads and online, are yearning to do something with their hands.

So the “maker space” movement — D.I.Y. communities to get people creating, be it for fun, for art or for entrepreneurship — is booming. Maker Faires are held around the world. Commercial operations like TechShop have popped up across the country. And tinkering is being promoted on college campuses from M.I.T. to Santa Clara University, as well as in high schools and elementary schools.

There's even a massive open online course, offered by the MOOC provider Coursera and taught by three scientists from the Exploratorium in San Francisco, called "Tinkering Fundamentals: A Constructionist Approach to STEM Learning."



A computer-controlled drumstick was made with a 3-D plastic printer and laser cutter, right (that's a student artwork on the cutter). Credit Richard Perry/The New York Times

Yes, tinkering is now a pedagogy.

Taking things apart and putting them together — skills children used to absorb in Dad's or Mom's workshop — has an important role to play in learning, according to Karen Cator, the chief executive of Digital Promise, a nonprofit organization created by Congress that focuses on the use of technology to improve education. "You're exploring creativity, you're exploring design thinking, you're developing a sense of persistence," she said. Building something new requires planning, trying and, yes, failing, and then trying again.

"These are incredibly important mind-sets for today's world," she said.

Ms. Cator, who served in the Department of Education during the first Obama term, talked excitedly about students who have designed child prostheses. "That's what they're going to remember their entire life," she said. "They aren't going to remember sitting in an electronics lecture."

At Rutgers, a bustling maker space can be found in a moldering wood-frame structure on the Livingston campus in Piscataway, N.J. The building once served as the command headquarters

for Camp Kilmer, a transportation hub for soldiers mobilizing for World War II; today, the building, still called Headquarters, houses computer repair offices and the division of continuing studies. And upstairs, there are wonders.

On any given day, as many as 20 students could be working on the array of equipment that the center offers training on and time to use, said Stephen M. Carter, who directs the university's Center for Innovation Education and co-founded the New Jersey Makerspace Association in 2012. Students might be working on a class project, doing "something entrepreneurial" or making Halloween costumes, he said. "We support all of it."

There are 3-D printers, which can be programmed to create wildly inventive shapes out of plastic or resin (like a decent copy of the Iron Throne from "Game of Thrones" or a bust of Groot from "Guardians of the Galaxy"). There is a laser cutter to etch materials like fabric, marble or wood and cut through plastic. Next door is an electronics shop, with racks upon racks of parts. Close by are drill presses, a router and a key cutter, which Mr. Carter refers to as "our gateway drug," a piece of equipment neophytes can use to produce something they really need. A common space with couches and a television gives students a place to talk, show off their projects or just hang out.



A 3-D plastic printer, top left, used to make various objects, including a robot with a motion-sensor heart. Credit Richard Perry/The New York Times

Mr. Carter cobbled it all together "by hook and crook and grants and saving."

Students love it. Alexandra Garey, who graduated from Rutgers in May, credits tinkering with changing the course of her studies, and life: "I went from somebody who was majoring in Italian

and European studies to someone who was designing and prototyping products and realizing any product that came into my head.”

October of senior year, she wandered into the maker space because she’d heard “you can make cool products” and was interested in exploring entrepreneurship and learning some business skills. “I had no idea what I was doing,” she admitted. But the students who used the place, mostly in science and engineering disciplines, were accommodating and patient, and soon she was on her way.

A month in, she got a call from a friend who wanted help coming up with a tool for children on the autism spectrum — a grip for a pencil or crayon that could be fitted with an extension so the teacher could guide the hand of students who dislike being touched. By January, Ms. Garey had designed and fabricated a piece through 3-D printing and it was being tested in New Jersey classrooms; she later modified the design for stroke victims and people with brain injuries. Now she is working on making French presses and coffee mugs out of Illy cans.

Then there’s Jason Baerg, an M.F.A. student from Canada, who paints in acrylics on paper or wood, and uses the laser cutter to etch the paintings and cut out shapes that he arranges into assemblages. “It allows me to bounce between abstract and figurative spaces in production and presentation,” he said. “I’m liberated.”

He appreciates that this is not a sterile engineering environment. The setting’s funkiness makes it “probably the perfect place to do this work,” he said, “like an exploratory safe space for you to go and try out your ideas.”

That kind of enthusiasm tells Mr. Carter he is on the right track. “U.S. schools are very good at finding the brain-smart people,” he said. “They are also very good at finding the best athletes.” But they are not so good at finding and nurturing people who, he said, describing himself, think with their fingers. The next Steve Jobs and Steve Wozniak, he said, are more likely to emerge from a maker space than a garage. Besides, he said, “it keeps kids off the street.”

**Correction:** February 13, 2016

Because of an editing error, an article last Sunday about “maker spaces” where students can tinker misstated the location of Rutgers University’s Livingston campus, where such a space is. It is in Piscataway, N.J., not Livingston.

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