In Curiosity Hacked, children learn to make, not buy

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With her right hand, my 8-year-old daughter, Kalian, presses the red-hot soldering iron against the circuit board. With her left hand, she guides a thin, tin wire until it's pressing against both the circuit board and the tip of the iron.

The tin begins to melt. There is a wisp of smoke, and a metallic smell drifts back to where I am standing behind her, a bit nervously, sweat running down my forehead onto my safety goggles (which I have always detested). I am ready to pounce if that soldering iron slips and touches her skin.

Instead, she pulls the iron and wire away. The solder cools, holding in place a metal pin from a computer chip. It's one of 20 solders she must make to attach the chip to the circuit board, and the moment seems to last forever.

Attaching the chip is just one of the tiny steps she and her brother, Liam, 10, will take over the next 10 months to create their own miniature computer, called a Hackerling Circuit.

We were building these computers as part of a program called Curiosity Hacked, started by some friends here. The goal is to teach kids a wide range of digital and analog skills: computer programming, 3-D printing, and sewing and drawing.

The program is part of much larger phenomenon known as the Maker

Movement. Having emerged in Silicon Valley almost a decade ago, the Maker Movement has grown into a global community of tinkerers, programmers and designers united by the simple satisfaction they get from making stuff.

In recent years, this movement has turned its attention to children through programs like Curiosity Hacked.

Beyond the skills they learn, the kids come away with a more fundamental lesson: that the act of creating something can be incredibly educational and deeply gratifying in a way that buying something off the shelf never will be.

We live in a world in which the objects around us are increasingly complex and intimidating. We are taught not to make, but to buy.

That creates a growing distance between us and the world. We don't know how our food is grown or our energy is produced. We can't sew a button on a shirt or take apart our computer.

That was the case for me growing up. I was a klutz who was laughed out of woodshop by a middle school teacher. In college, I was going to be an engineer, but hated chemistry lab and those awful safety goggles.

Even now, I can't change the oil in my car. I am a member of the Jiffy Lube generation.

The Maker Movement caught the attention of Richard Sennett, a professor of sociology at the London School of Economics. Sennett studies the nature of work and our relationship to the objects in our lives.

In his 2008 book, "The Craftsman," Sennett explored the idea that "making is thinking." That there is spiritual and intellectual value in

creating things with one's hands. The problem is that such acts take time, and curiosity, and patience. As the pace of the world accelerates, people choose convenience over crafting.

"There is something very profound about the connection between the hand and the mind," Sennett said. "Physical craftsmanship can make you slow down and lead to a very different way of thinking about the world. Doing things faster and faster is not necessarily good for critical thinking."

Just as Sennett was researching his book, someone in Silicon Valley was starting a movement to push those same ideas.

In 2005, Dale Dougherty, an editor at O'Reilly Media, which publishes tech-focused books and magazines, launched a magazine called Make. It covered a range of crafts, such as geeky electronics and more traditional arts.

A year later, Dougherty staged the first Maker Faire in San Mateo County to bring together the loose network of makers he had stumbled across. That Maker Faire drew 20,000 people. Last May, 130,000 attended over two days. The event has spawned 140 other annual Maker Faires around the world.

I attended my first Maker Faire with my family in 2009. It felt like being plopped down into a carnival of creation.

The wonders we saw included a life-size version of the game Mouse Trap. Steam-driven motorcycles made of wood. The stable of R2-D2s built by roboticists.

There was a fabric tent where children spent hours cutting up old clothes to sew new garments.

Dougherty realized that after the weekend ended, most kids had nowhere to learn these skills. In 2012, he launched the nonprofit Maker Education Initiative so children could get hands-on education in science, technology, engineering, art and math.

"This is how we learn, by manipulating and changing the physical world around us," Dougherty said. "Kids want more of that."

Back in my North Oakland neighborhood, Samantha Matalone Cook and her husband, Chris, were active members in a hacker space called Ace Monster Toys. Samantha is an educator; Chris is a computer systems administrator.

AMT had equipment such as laser cutters, 3-D printers, computers and sewing machines for adults to build anything they could imagine. In the fall of 2012, the Cooks, along with a friend, Garratt Gallagher, began making plans to start a program they initially called Hacker Scouts, to let kids have access to those same tools.

"When kids come to us, we want to give them the skills and the tools they need to achieve these big ideas they have," Samantha said.

The Oakland chapter of Hacker Scouts was called a guild. By the following summer, there were 25 Hacker Scout guilds in 12 states.

Within a year, they had outgrown AMT. To fund their own location, they launched a Kickstarter campaign that raised $37,000 from 557 donors.

The only sour note was when the Boy Scouts of America threatened to sue them unless they changed the name, which they did, to Curiosity Hacked.

In late 2013, Curiosity Hacked debuted its space in North Oakland, filled with laser cutters, 3-D printers and a wide array of tools.

When the Cooks first told our family about Hacker Scouts, we immediately wanted to join.

The coming months were filled with great moments of wonder and discovery. And yes, at times it was excruciating, testing not just my knowledge but my patience with things moving slowly.

We would arrive at the weekly meetings and talk about the various components that needed to be attached to the Hackerling Circuit.

In addition to soldering 28 components to it, the children had to create a case that would cover the finished circuit board using design software. They had to feed that design into a laser cutter that would cut the wood into pieces they would then assemble. They also had to sew a leather pouch to hold it.

Working a couple of hours each week, the kids took months to build the Hackerling Circuit.

Some weeks, my kids soldered a single pin because the tin spread too far, and touched other pieces. They then had to use a little tool called a "solder sucker" to remove the faulty solder, a chore that took 20 or 30 minutes. There were meetings where all we did was remove a few poor solders.

Gradually, my children saw progress. A switch finally in place. A tiny speaker added. An LED screen that displayed just a few characters. Some buttons and lights. No one would mistake this for a Mac. But it was a computer. Made with their own hands.

After months of work, though, there was still one vital question: Would it work?

To test hers, Kalian plugged it into a laptop and tapped a few buttons to download a program. We waited a few seconds. And then ... nothing. She let out a groan. I felt the weight of 10 months of wasted work.

After re-inspecting all the solders, Kalian switched the circuit on and off. She unplugged the cable running to the laptop and re-attached it. She downloaded the software again.

This time, the circuit sprang to life. Lights blinked. Digital sounds crackled out of the speaker. Then, we experienced an almost indescribable satisfaction when the LED screen flashed on and five letters scrolled across its display:

"Hello."